

BEVERAGE & FOOD WORLD

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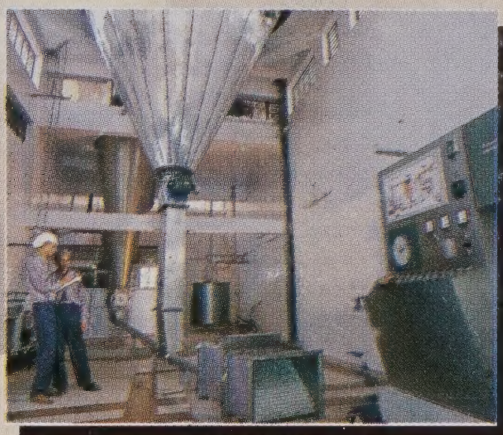
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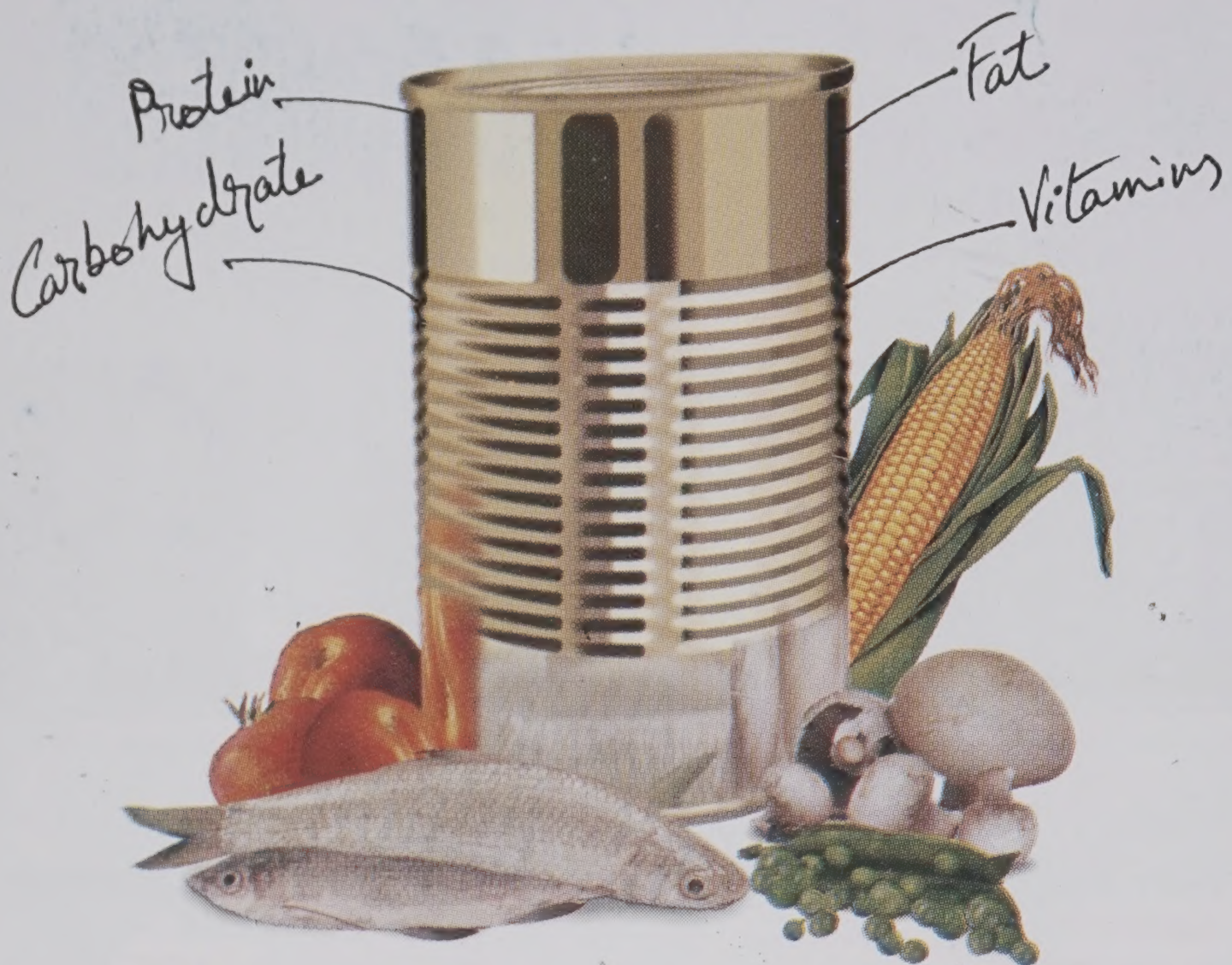
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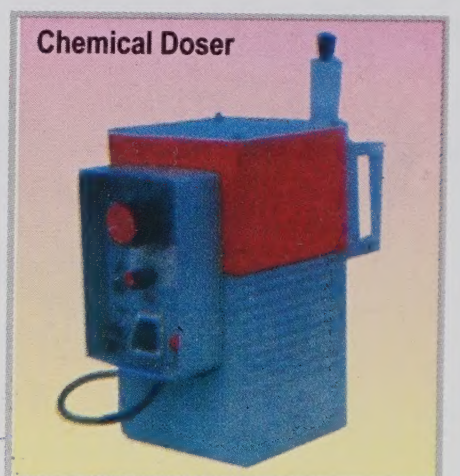
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Our Growth



Value of Cargo

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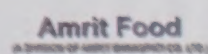
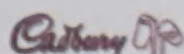
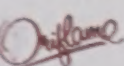
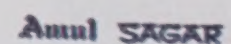
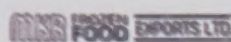
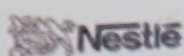


Tonnage of Cargo

TOTAL 28500 TONS



Our Customers





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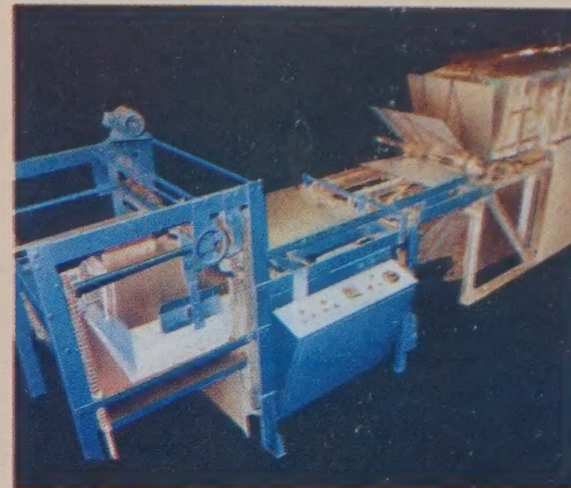
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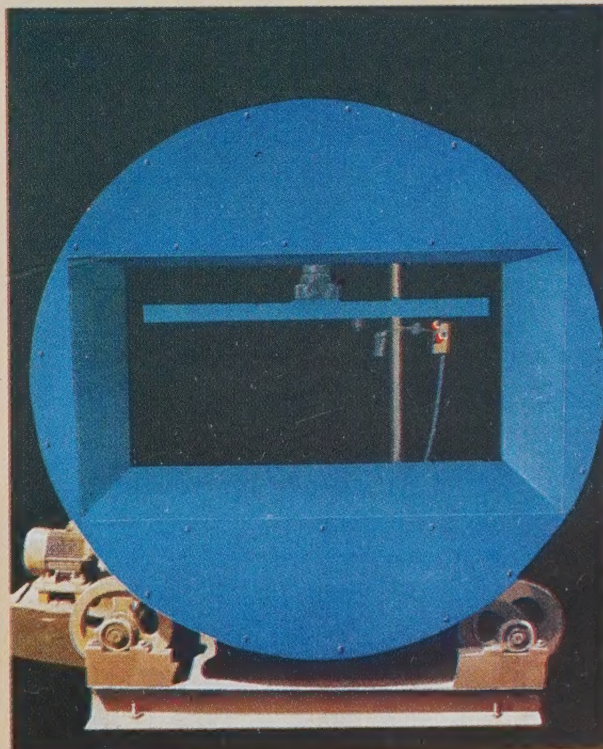
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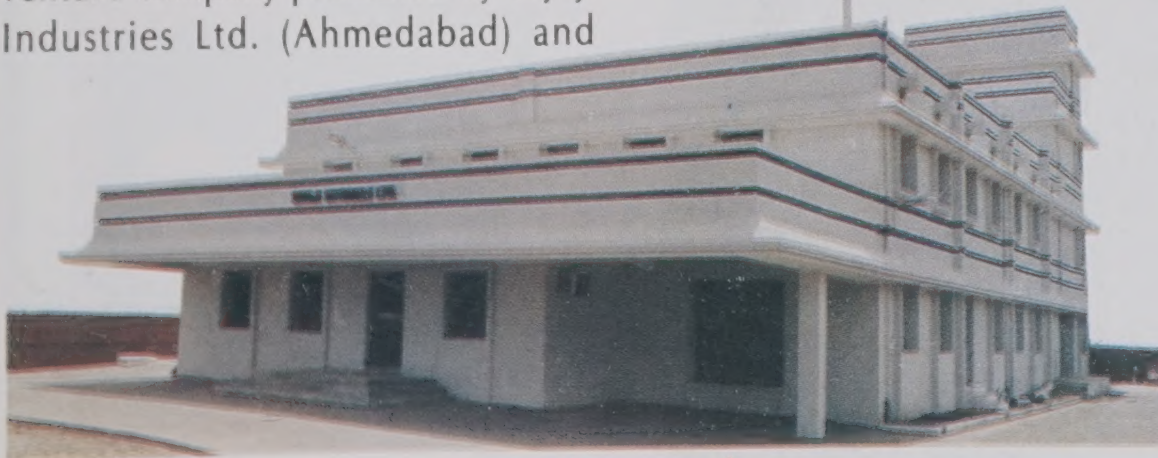


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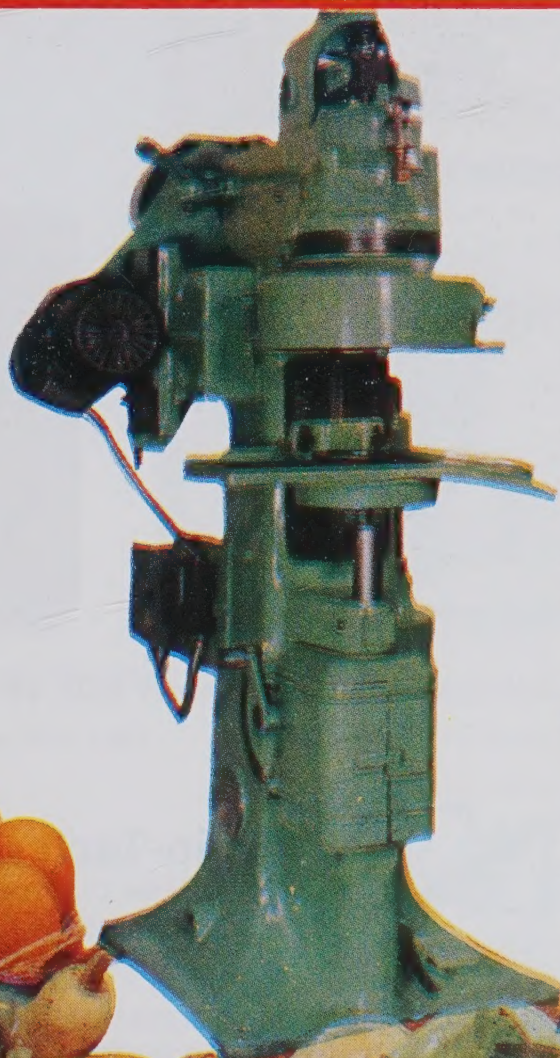
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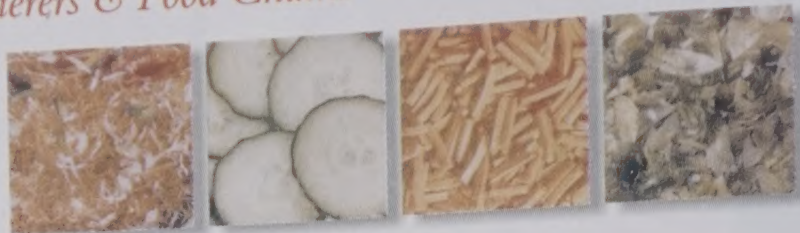


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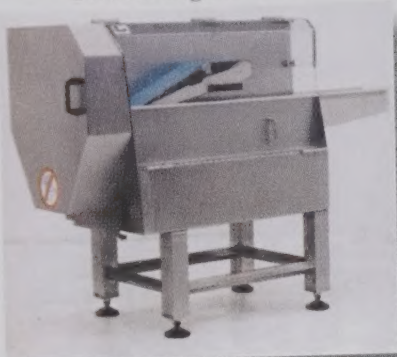
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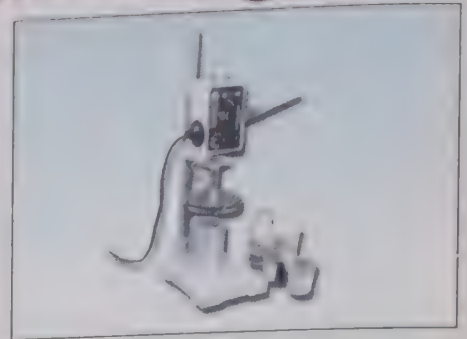
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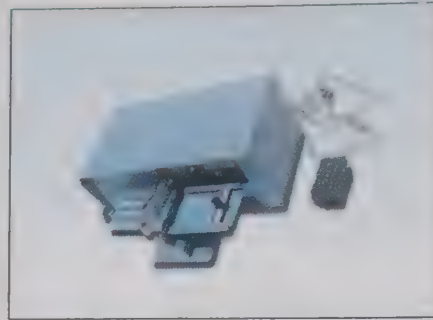
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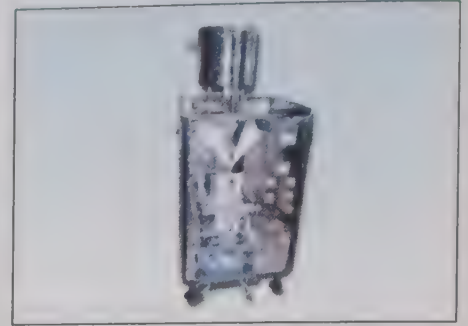
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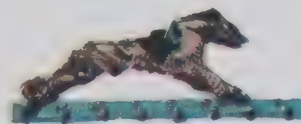
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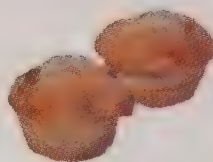


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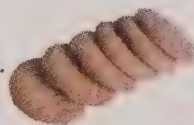
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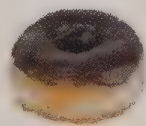


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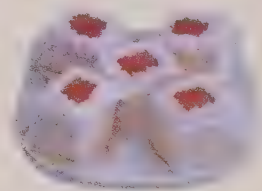
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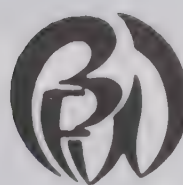
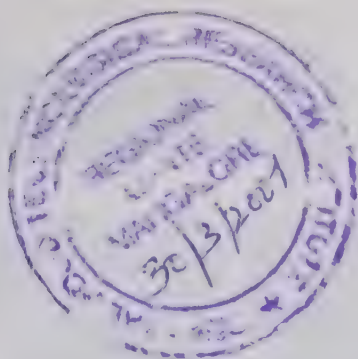
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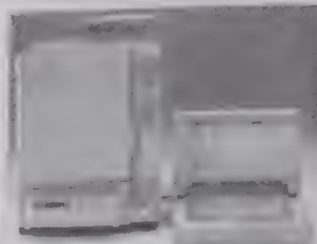
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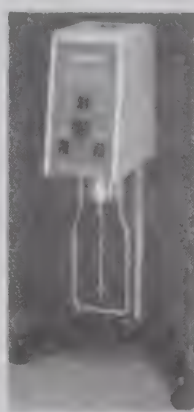
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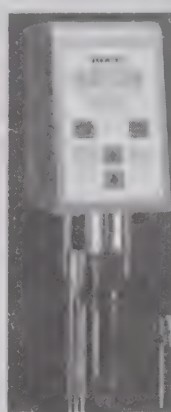
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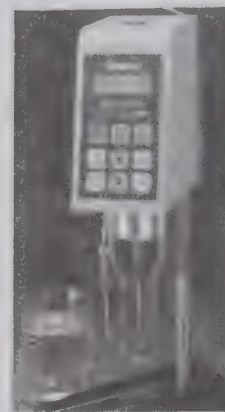
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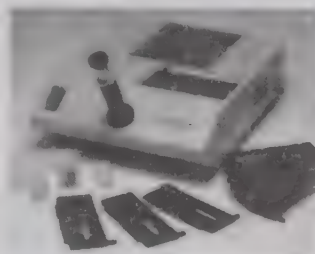
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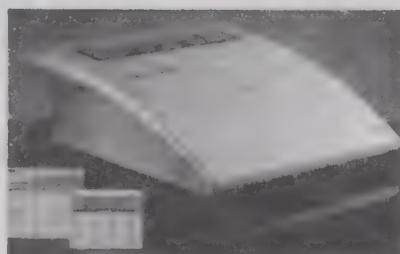
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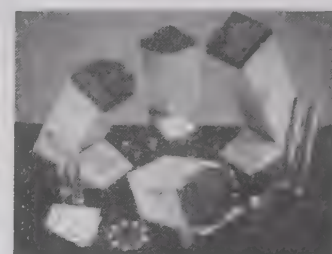
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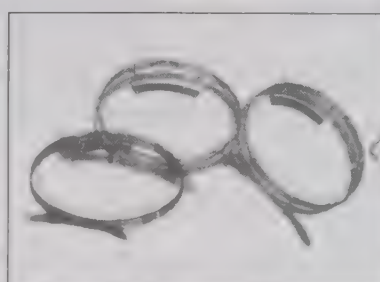
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Achieving Results with Ozonation

by
V. Baratharaj

Ozonation is more than just introducing ozone in the water. Ozone mass transfer (mixing) in water treatment is very important to achieve results. Often these aspects are neglected by small time manufacturers/dealers.

It is important to realize that the Ozone Equipment cannot be offered for sale like a domestic equipment over the counter and the proper application procedure must be adopted to ensure successful result. This requires adequate Technical know-how. The author has seen some clients purchasing Ozonators and carrying them to their premises like a TV set ready for use!!

In majority of cases in today's Mineral Water Plants in India (including that of some leading brands), the ozone is mixed with the water by introducing the ozone from the Ozonator into the treated water tank. (Diffusion method) Ozone users often complain that they are not achieving residual ozone levels. A combination of inadequate ozone dose, concentration and lack of application technology could likely be the root cause. This practice of ozone mixing defeats all purposes of the utilization of ozone for the following reasons:

1) Studies have indicated that properly designed pipeline dissolution systems provide significantly improved mixing over bubble diffusion system. Stable ozone residuals are never achieved by these methods because the incoming water flow and the applied ozone feed gas are usually spread across the entire cross sectional area of the tank, weakening the available energy input for two phase mixing. These tanks are to be specially designed to prevent: a. Channeling of gas bubbles; b. Ozone flow back-mixing and short circuiting; c. Inadequate gas liquid contact.

Invariably these systems result in incomplete treatment of water.

Therefore it is imperative that a pipeline dissolution system and pipeline ozone contactors are provided for an aggressive and nearly homogenous mixing of the ozone in the water by ensuring sufficient energy dissipation across the venturi injectors and turbulent regime present in the pipeline contactors.

Dangers of Incomplete Ozone Reactions Due to Low Mass Transfer & Insufficient Contact Time

Natural waters contain varying quantities of humic and fulvic materials (organic compounds). These are low molecular weight substances that can be degraded to simpler non polymeric oxidation products. These are all readily bio-degradable products that represent food for the micro organisms. Therefore if ozonation is not allowed to complete, to further oxidize these compounds, then there is an increased risk of micro-organism growth by producing assimilable food. Thus care is to be taken that all the reactions are complete and organics oxidized. The following are some hidden facts often ignored in ozone application:

1. That Indian waters contain more organics than many waters around the world and chlorination and carbon filtration alone will not remove these organics present in the water.

2. That in case of insufficient ozone, the organics in the water are not converted to their end products namely carbon dioxide and water, but can end up as aldehydes, ketones, keto-acids, carboxylic acids that can impart odor to your water
3. That these partially oxidized organics are easily biodegradable and offer excellent food materials for the bacteria and your water can breed bacteria after a few days.
4. These partially oxidized organics can form cross linked polymers that can precipitate in the water at a later stage.

The action of ozone as a disinfectant is governed by CHICKS LAW where concentration-time relation is fixed for each bacteria/virus etc. Sufficient Ozone contact time must be allowed for achieving completed ozone reactions.

Obtaining Residual Ozone – ORP VS PPM

Most often what is required by most plant operators is the PPM content of ozone in the water. Depending on PPM reading for defining the residual ozone content will not be a very accurate method for the following reasons.

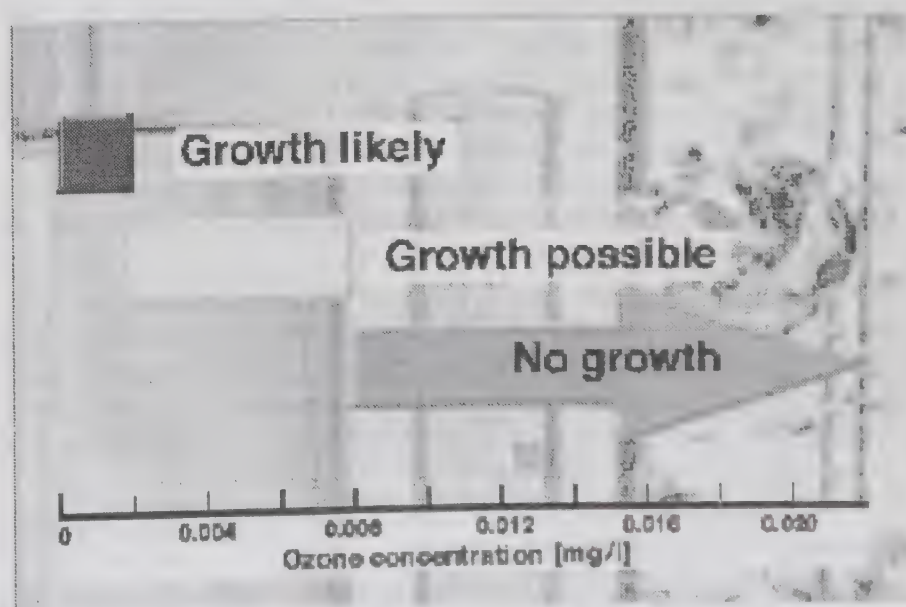
Obtaining Residual Ozone is the combination of various parameters that affect the kinetics of ozone. The following factors play a very important part:

1. The dosage and concentration of ozone.
2. The temperature of the water
3. The methodology of ozone dissipation
4. The pH of the water
5. The type of pre-treatment and the subsequent contact time for ozonation.
6. The ozonation process

a) The Dosage and Concentration of Ozone

The ozone being in sparingly water, its dissolution in water is governed by Henry's law. The higher the concentration of the ozone the more it dissolves. It is a normal procedure that in bottled water manufacturing the ozone concentration used will be around 1.2% w/w. By using a higher concentration a higher PPM can be achieved.

**OZONE CONCENTRATION
& MICROBIAL GROWTH**



This process is particularly used in food processing industries and seafood industries. Oxygen concentrators are deployed to increase the concentration.

To obtain a residual ozone of above 0.5 ppm, ozone at above 3 % concentration, specially designed ozone Contactors and a water temperature of 5 Degrees Cel was required in one installation in the seafood industry .

In many cases it has been noted that UV ozonators are deployed in water treatment. The concentration of ozone In UV Ozone will be only to the tune of 0.004 ppm and hence by Henry's law no ozone is likely to dissolve in water. World over, UV Ozone is used for Air treatment where the quantum of ozone required is very low. Therefore in most cases the user of UV Ozone in water treatment often ends up treating the air instead, as all the ozone generated cannot be dissolved in the water and escapes into the Air!

b) The Temperature of the Water

This plays a very crucial role. The lower the temperature the more the ozone will dissolve. The following table will make this point very clear.

Water Temperature.	Degrees Celsius						
	0	5	10	15	20	25	30
OZONE (O ₃) in Air	OZONE (O ₃) in Water						
1% by wt (=12.07 g/m ³ ; = 6,044 Ppm-vol.)	8.31	7.39	6.50	5.60	4.29	3.53	2.70
1.5 % by wt (= 18.11 g/m ³ ; = 9,069 ppm-vol.)	12.47	11.09	9.75	8.40	6.43	5.29	4.04
2% by wt (=24.14 g/m ³ ; =12,088 ppm-vol.)	16.62	14.79	13.00	11.19	8.57	7.05	5.39
3% by wt (= 36.21 g/m ³ ; = 18.132 ppm-vol.)	24.92	22.18	19.50	16.79	12.86	10.58	8.09

Note: The concentration of ozone gas is determined at a standard temperature of 20 Degrees Cel. (68 Degrees F) and a standard pressure of 1 atmosphere (101 kPa).

COURTESY: 34th Annual Meeting of Society of Soft Drink Technologists, Las Vegas, APR1997

The normal temperature of water will be around 30-35 degrees which means that the amount of ozone that dissolves will be around 2.70 ppm only. The remaining ozone that is introduced in the water will be in the undissolved form that will be utilized for other reactions (slow) such as TOC reduction, precipitation of iron, manganese etc

c) The Type of Ozone Dissipation Deployed

Ozone can be introduced into the water by three methods: a. venturi; b. diffusers; c. static mixing

The venturi mode is a flash mixing that can guarantee 95% transfer of ozone .

For primary ozonation and for bottled water normally this type is preferred. This process is often termed as side stream absorption method. The selection of the venturi will play a very important part.

It is the dissolved ozone that will respond to the residual tests and likely to remain in the water for a longer time. Diffusion methods are deployed for higher grade ozone applications and can be either dome type or radial type.

d) The pH of the Water

Ozone dissociates into hydroxyl group at higher pH. Therefore if the pH of your water is around 7.5 and 8.0, you can be rest assured that some of the ozone will covert itself to hydroxyl group that will effect the residual ozone level. Hydroxyl group is a poor disinfectant though they are powerful oxidizing agents

e) The type of Pre-Treatment and the subsequent contact time for Ozonation

Whenever chlorine is used as a primary disinfectant the

residual chlorine that will always be present even after carbon filtration will effect the residual ozone. It has been seen that even with best of carbon filtration, small amounts of chlorine, (as low as 0.05 PPM) is normally present. This will effect the residual ozone measurement. One way of avoiding this during measurement is to use malonic acid reagent while measuring ozone.

f) The Ozonation Process

Even with the use of chlorine as a primary disinfectant as high as 5.0 PPM it has been noted that the total organic content of the water will still remain. This TOC will consume ozone. Therefore if ozonation is used at the final filling level it may be difficult to achieve residual ozone of 0.3 PPM. Using a recycling system where the water is repeatedly ozonated it can help to achieve the required Redox level (residual ozone) unless a higher concentration ozone is used. Moreover to facilitate proper transfer of ozone after injection of ozone into the water, it is mandatory to introduce a Multiple contact U tube assembly.

Oxidation Reduction Potential (Redox)

Because of these difficulties in ozone measurement as well as the inaccuracy of the method used to determine ozone residual, it is strongly recommended to depend on the ORP method rather than the PPM method. An ORP of 900 mV will correspond to a ozone residual of 0.2-0.4 PPM with no doubts on any inaccuracy that may creep in during other methods of determination.

The ORP technology allows the plant operator to make accurate assessment on the level of ozonation required before filling. Proper application methods will help the achievement of Redox level of above 900 mV...

Ozone Residual, E. Coli Destruction & Microbial Growth

The final sanitation level in water is often judged by the presence of E.Coli (most difficult pathogen to kill) and the microbial growth (Total plate count after 48 hours.). Maintaining a residual ozone of just 0.03 PPM with a contact time of just 1 sec. can result in almost a 99% destruction of E-Coli. A 0.02-PPM residual ozone can achieve a NO MICROBIAL GROWTH result. (See Figure). Very often this level is almost exceeded and hence ozonation is the surest way to achieve water quality standards.

A well-designed ozone disinfectant system could achieve the objectives listed below:

1. Disinfection
2. Inactivation of virus & protozoa, cryptosporidium and pseudomonus
3. Color removal
4. Odor & taste removal
5. Conversion of COD into BOD and reduction of BOD
6. Improvement of Micro flocculation (pre Ozonation)
7. Reduction of THMs and its precursors
8. Oxidation of manganese, iron, sulfites, nitrites and cyanides
9. Reduction of network protection chemicals like chlorine, chloramine etc
10. Removal of phenols, pesticides and detergents in water.



Controlled Atmosphere Storage VS Other Fresh Fruit Preservation Technologies

by
*Jyotshna Chauhan, **Saghir Ahmad, ***Iqbal Ali

Abstract

Among various methods of fresh fruit preservation, controlled atmosphere storage is most effective with advanced techniques. A controlled atmosphere storage (CA storage) utilizes a strictly specified mixture of gases namely carbondioxide, oxygen and nitrogen. The desired composition of gases is maintained by artificially introducing a mixture of gases, by gas generating device and carbondioxide scrubbing unit. A controlled gas regime around food material minimizes respiration rate, reduces rate of ripening, enzymatic change, oxidation reaction and retards microbial growth. The desired composition of gases vary for different horticultural crops and it even changes for different varieties of same fruit viz optimum gas mixture for many apple varieties is only 5% carbondioxide and 3% oxygen and the rest nitrogen, since a higher carbon dioxide content causes browning of fruit tissues (8). Management of low temperature is another requirement for maintaining the quality of fruits and 0°C is recommended for many varieties of apples.

Introduction

Storage is one of the most important aspects of post harvest handling of fruits. The main objective of storage is to extend their period of availability without sacrificing quality. A sustained quantity of (25-30%) of fruits go waste in India due to lack of proper storage facilities (Fig. 1).

Fruits are living entities and undergo physiological and biochemical changes after harvest. The primary purpose is to control the rate of transpiration, respiration, ripening rate and also undesirable biochemical change. The various techniques to increase the storage life of fresh fruits are

- Cold storage
- Ice banker
- Hypobaric (Sub-atmospheric) storage
- Waxing
- Polymeric film wrapping
- Chemical
- Irradiation
- Evaporative cooling
- Controlled atmosphere storage.

Biochemical Aspect in a CA storage

During CA storage preservation, the fruits utilize the oxygen in the atmosphere to produce carbondioxide, water vapour and other essential organic substances (ethylene and a number of other substances) which together constitute the fruit aroma. As we know, respiration is a process which has been identified with life and so long as the fruit respire it stays alive. The moment respiration ceases, the supply of energy is disrupted. As a result, the complex cell structure is dislocated and the life processes become disorderly, all the cells and ultimately the whole fruit perishes. Respiration equation, $C_6H_{12}O_6 = 6CO_2 + 6H_2O + 674 \text{ K Cal. of energy}$ shows that the substance which produces energy, is essentially glucose. But it does not imply that other

substances such as protein, fats, and organic acids have no role in respiration since intermediate products formed during certain stages of their conversion play a significant role in the process of oxidation of sugars.

The life cycle of fruits can be divided into three phases according to the rate of respiration (i) Preclimacteric – during this period the fruit grows while the rate of respiration is low (ii) Climacteric – during this period the rate of respiration rises sharply to maximum and the ripening of fruits starts and (iii) Postclimacteric – during this period the rate of respiration slows down, the process of ripening and senescence is fully established, and fruit perishes. These phases are more pronounced in apples, pears and bananas. It is found that the best keeping quality is observed in fruits harvested either in the preclimacteric state or in the climacteric phase such fruits ripen slowly during preservation.

Many investigations have revealed that the concentration of oxygen (it's partial pressure) in the atmosphere substantially affects the process of respiration in fruits. Thus, respiration in an atmosphere of pure oxygen i.e. at atmospheric pressure, produced 5 mg CO_2 per 100 gm of apples per hour with a rise in oxygen pressure to 6 atm respiration of fruits etc., increased to 3.3mg CO_2 per 100gms of fruits per hour. A further rise in oxygen pressure to 11 atm resulted in practically no respiration and apples perished within seven days. This effect was produced because of oxygen and not because of its pressure. With an oxygen concentration of 21% in the atmosphere and pressure 5 atm the respiration of fruit was the same as in an atmosphere of pure oxygen at a pressure of 1 atm. (1,2).

Detailed studies of the respiration of apples based on oxygen concentration showed that although reduction of oxygen from 21 to 14% produces no effect on respiration intensity but reduction to 4% resulted in gradual slowing down of respiration but RQ (Respiration quotient) maintained unity, when there was an oxygen concentration of 1-3%, a disproportionate amount of carbondioxide was produced and this resulted in a sharp increase in the RQ (4). Thus an oxygen concentration of 5% considerably delays climacteric rise in respiration as compared to fresh air.

A study of the causes for variable effects of the same oxygen level on fruits at different stages of ripening revealed that the optimum level of oxygen respiration differs not only in different tissues of the same fruit, but also within the same tissue at different stages of its development.

Theoretical studies on the effect of partial pressure of oxygen on respiration in plant tissue, cells and whole organs showed that this dependance can be described by following equation:

$$V = \frac{V_m \times C_i}{K_m + C_i} \quad \text{where}$$

V = the observed rate of respiration
 V_m = the maximum rate of respiration
 K_m = the respiratory enzyme constant and
 C_i = the oxygen concentration

The above equation exhibits overall dependence of respiration of plant tissues on oxygen concentration in atmosphere.

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Role of Carbondioxide

Carbondioxide has antimicrobial effect and reduces respiration rate. It is recommended that carbondioxide should not be used in concentration exceeding 20% (Ledward 1970). According to certain studies (9), respiration in apples during the post climateric period is markedly suppressed in an atmosphere consisting of 5-10% carbondioxide. The immediate reaction of fruits to increased carbondioxide concentration is due to sharp rise in respiration. As a result the respiration intensity drops to subnormal. Studies of this effect shows that the reaction depends on several factors, including the strain peculiarities of fruits, the state of ripeness, the rate of increase of CO₂ in the atmosphere and extent of CO₂ concentration.

Biological effect of ethylene

We know that the ripening of fruit is marked by the formation of ethylene. The release of ethylene starts only after the fruit reaches a definite stage of maturity. At this stage, ethylene will have pronounced biological effect, rapid ripening of fruit occurs when the air in the greenhouse is mixed with ethylene. It is also known that green bananas preservation in close proximity with ripe apples, ripens and turns yellow very fast. Comprehensive studies were made by Rakitin (10) on enhancing the ripening of fruits made under the influence of ethylene. The source of ethylene i.e. whether it is biogenous or obtained as a result of chemical changes seems to be of no significance. Similar reaction to ethylene furthered the concept that it functions as the ripening hormones.

Biosynthesis on ethylene and biological effects are influenced by change in gas composition of atmosphere surrounding the fruit. It was established in ripe bananas, that the content of ethylene does not exceed 0.2 parts per 1000 parts of air and it increases to 2:1000 parts during ripening. The increase occurs at short intervals of time. Preservation of banana in atmosphere containing a low concentration of O₂ (with no CO₂) retards the process of ethylene formation. At O₂ concentration of 10-13% only slowing down of synthesis of ethylene was noticed, at 5-7% O₂ the production ceased but was immediately restored after the fruits were transferred to the air. Finally at 1% O₂ concentration, synthesis was suppressed so much so that it was never restored in the air. Organoleptic characteristics of fruit is influenced by gas composition.

During preservation, fruits acquire a characteristic aroma lose astringent, bitter taste of acid and develop soft consistency. Ripe fruits have a definite colour which is characteristic of the type of fruit and its varieties. In the event of over-ripening some of these qualities are lost. For example the flesh of apples becomes mealy but it becomes soft like mucus in pears and bananas so that aroma is lost and taste changes.

Fruits preserved in a CA storage as a rule, have a more solid consistency than those preserved in air. Kidd and West (5,6) found that the solid consistency of apples, as determined by penetrometer depends directly on the concentration of CO₂ in the atmosphere. Bramley seedling apple, when subjected to gas mixture containing 10% O₂ and different concentrations of CO₂ (0.5, 5, 10 & 15%) at temperature of 3°C showed the following solid consistency in pounds after 33 weeks of preservation. The solid consistency of apples preserved at 3% O₂ & 5% CO₂ was 0.6 lb more than when preserved at 3% O₂ and no CO₂. Canadian apples preserved at 4°C in a controlled atmosphere with different composition showed varying rates of softening. This process was very slow in a medium containing 2% CO₂ and 5% CO₂.

Conclusion

Technical and economic calculations (3) revealed that the additional capital outlay for hermetic sealing of the chamber and equipment for the creation and control of gas composition comprised approximately 10-15% of the total cost of construction of the cold storage building. Additional operation cost for storage of fruit in chambers with a controlled atmosphere which is associated with increased depreciation, expenditure on current repairs of gas insulation, additional equipment, somewhat increased consumption of electricity and enhanced pay service personnel do not exceed 15-20% of the total operational cost of cold storage building.

But at the same time the quality of fruit is well maintained during storage. Hence the economy of reduction (on the average half to one third) in the natural damage and spoilage of fruits stored in conventional storage.

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Studies on Extending the Shelf Life of Pretreated Guava by Vacuum Packaging

by
S. Kannan and A. Susheela Thiramaran

Abstract

The main objective of this study was to increase the shelf life of fruits through pretreatments and vacuum packing. Guava (*Psidium guajava* L.) was pre-treated with wax, oil film, purafil packets and tissue paper wrapping along with control and polybag packing in 150, 200 and 400 gauge thickness. These samples were packed under vacuum and another set of these were stored under ordinary packing. Then the fruits were stored at room (36°C) and refrigerated temperatures and analysed for physico-chemical changes. During storage, length and breadth decreased and firmness increased. Moisture, acidity, vitamin C, and total sugar decreased whereas reducing sugar and total soluble solids (TSS) increased during storage. The shelf life of the fruits increased upto one week under vacuum packing and exhibited freshness.

Introduction

Controlled atmosphere is used for prevention or retardation of fruits senescence and associated biochemical and physiological changes. Generally fruit ripening includes a complex of changes most of which are quite likely biochemically independent. One of them transforms the mature but unripe fruits into a clearly senescent fruit. Changes occur in colour, respiration rate, ethylene production, and tissue permeability and in flavour relative to sweetness. Reduced O₂ atmospheres are generally more effective in prevention of ripening. Temperature is also the most effective environmental factor in prevention of fruit ripening. To delay ripening, fruit should be held as close to 0°C as possible. However, some fruits especially those of tropical and subtropical origin suffer chilling injury. The use of controlled atmospheres as a supplement to proper temperature maintenance to delay ripening is consequently more effective for chilling sensitive fruits, but it is generally beneficial for all fruits. Hence this study was undertaken to increase the shelf life of guava by vacuum packing.

Materials and Methods

In the present study fully matured but unripe Lucknow 46 guava (*Psidium guajava* L.) was used. The other miscellaneous items were purchased from local depart-

mental stores. Packaging materials, polyethylene bags of (6 × 8") 150 gauge, (10 × 14") 200 gauge, (12 × 16") 400 gauge thickness were used.

Pre-treatment was done and denoted as above, T₁ - control, T₂ - fruits packed in polybag, T₃ - fruits with wax application, T₄ - fruits with oil film treatment, T₅ - fruits packed with purafil packets, T₆ - fruits wrapped with tissue paper. The fruits were given the pre treatments and packed in ordinary and vacuum packing (Fig.1) by using above mentioned polyethylene bags. The packed fruits were stored at room temperature (36°C) and refrigeration temperature (20°C) were analysed. The physical changes like length, breadth and firmness were studied. The chemical changes like moisture, TSS, acidity, Vitamin - C, reducing and total sugars were analysed as per the procedure in Ranganna (1995). The sensory evaluation was done (9 to 1 scale) with a panel of 10 untrained judges as per the procedure of (Watts, *et al.*, 1989)

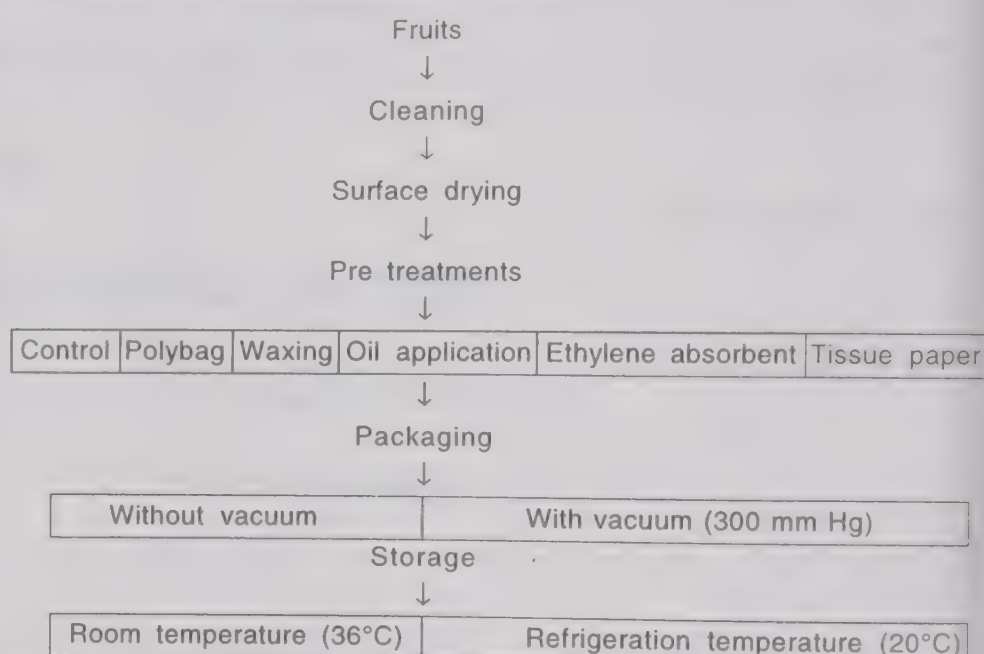


Fig. 1. Flow chart Diagram for Pretreatment and packaging of fruits

Results and Discussion

The data collected on pre-treatments and packaging of fruits and their shelf life, their impact on physical and chemical changes, sensory analysis of the fruits were

Table 1. Effect of pre treatments on physical changes of guava

Storage period (weeks)	Treatment	Room temperature (mean)			Storage period (weeks)	Refrigeration temperature (mean)		
		Length (cm)	Breadth (cm)	Firmness (%)		Length (cm)	Breadth (cm)	Firmness (%)
0	Initial	4.23	4.08	5.55	Initial	4.75	5.75	5.00
1	T ₁ (Control)	—	—	—	1	—	—	—
	T ₂ (polybag)	4.10	4.01	9.48		4.45	5.14	9.73
	T ₃ (Waxing)	4.21	4.07	9.44		4.70	5.55	9.03
	T ₄ (Oil film)	4.09	4.00	10.5		4.23	5.13	10.85
	T ₅ (Purafil)	4.2	4.03	9.46		4.48	5.34	9.56
	T ₆ (Tissue paper)	4.0	3.99	12.55		4.00	4.83	12.95

Table 1. Initially the mean length was recorded as 4.23 per cent and 4.75 per cent respectively whereas it decreased to 4.21 and 4.70 in T₃ (waxing) which was the minimum and maximum decrease of 4.0 percent was registered at T₃ at both temperatures. In the case of breadth i.e the minimum decrease was found in T₃ (waxing) 4.07 and 5.55 percent whereas maximum decrease was seen in T₆ (tissue paper) 3.99 and 4.83 per cent at room and refrigerated temperatures. The firmness of the fruit was initially recorded as 5.55 and 5 per cent whereas during storage maximum increase was found in T₆ (tissue paper) 12.55 and 12.95 per cent. Minimum decrease was seen in T₃ (waxing) 9.44 and 9.03 per cent at room and refrigerated temperatures with vacuum in 200-gauge thickness.

Generally firmness decreased with length during the storage. According to Maini *et al.*, (1985) firmness of the apple decreased with length and breadth. In this present study, firmness of fruits increased during storage. According to Singh *et al.*, (1984) wax emulsion treatment was more

effective in maintaining the firmness of fruits as observed in the present study.

During storage, the chemical changes were analysed and presented in Table 2. In guava (moisture, acidity, vitamin C, total sugar) minimum reduction was found in waxing (82.65 and 80.80g, 0.24 and 0.18g, 192.65 and 210.50 mg, 7.42 and 7.13g per cent) and an increase was found in TSS and reducing sugar (11.42 and 10.74°brix, 3.97 and 4.24g per cent) packed with vacuum in 200 gauge thickness. The shelf life came up to one week at both the temperatures.

Table 3 revealed that there was decrease in the mean length and breadth during storage. Minimum reduction was found in V₃ (vacuum) followed by V₂ (ordinary). There was an increase in the firmness found during storage, statistical analysis of the data revealed that V₃ (vacuum packing) significantly differed from others.

From table 4 it was observed that minimum reduction in moisture, acidity, vitamin C, and total sugar was found in V₃

Table 2: Effect of pre treatments on chemical changes of guava

Storage period (weeks)	Treatment	Room temperature (mean)						Refrigeration temperature (mean)					
		Moisture (g%)	TSS (°brix)	Acidity (g%)	Vitamin C (mg%)	Reducing sugar (g%)	Total sugar (g%)	Moisture (g%)	TSS (°brix)	Acidity (g%)	Vitamin C (mg%)	Reducing sugar (g%)	Total sugar (g%)
0	Initial	82.72	11.25	0.26	239.25	3.91	8.85	80.95	10.4	0.29	239.1	3.88	8.11
1	T ₁ (Control)	—	—	—	—	—	—	—	—	—	—	—	—
	T ₂ (polybag)	82.11	11.66	0.18	192.5	4.31	7.02	80.28	10.84	0.14	189.58	4.46	6.94
	T ₃ (Waxing)	82.65	11.42	0.24	192.65	3.97	7.42	80.80	10.74	0.18	210.50	4.24	7.13
	T ₄ (Oil film)	81.71	11.89	0.15	187.14	4.37	6.76	80.26	10.92	0.15	187.17	4.67	6.85
	T ₅ (Purafil)	82.64	11.65	0.19	195.71	4.16	7.29	80.73	10.76	0.16	198.13	4.34	7.12
	T ₆ (Tissue paper)	81.28	12.55	0.15	183.07	4.58	6.65	80.05	12.48	0.08	160.95	4.70	6.82



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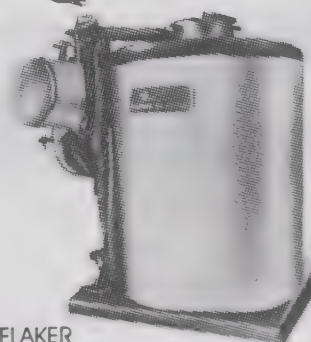
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Table 3. Effect of packing on physical changes of guava

Storage period (weeks)	Packing	Room temperature (mean)			Storage period (weeks)	Refrigeration temperature (mean)		
		Length (cm)	Breadth (cm)	Firmness (%)		Length (cm)	Breadth (cm)	Firmness (%)
0	Initial	4.23	4.08	5.55	Initial	4.75	5.75	5.00
1	V ₁ (Control)	—	—	—	1	—	—	—
	V ₂ (Ordinary)	3.9	3.92	10.63		4.18	5.29	9.01
	V ₃ (Vacuum)	4.13	4.06	6.52		4.39	5.67	6.37

Table 4. Effect of packaging on chemical changes of guava

Storage period (weeks)	Packing	Room temperature (mean)						Refrigeration temperature (mean)					
		Moisture (g%)	TSS (°brix)	Acidity (g%)	Vitamin C (mg%)	Reducing sugar (g%)	Total sugar (g%)	Moisture (g%)	TSS (°brix)	Acidity (g%)	Vitamin C (mg%)	Reducing sugar (g%)	Total sugar (g%)
0	Initial	82.72	11.25	0.26	239.25	3.91	8.85	80.95	10.4	0.29	239.1	3.88	8.11
1	V ₁ (Control)	—	—	—	—	—	—	—	—	—	—	—	—
	V ₂ (Ordinary)	68.39	11.76	0.12	154.52	4.98	5.85	67.61	12.58	0.12	147.42	4.09	5.77
	V ₃ (Vacuum)	68.91	11.66	0.17	164.84	4.95	5.87	67.77	12.17	0.12	168.03	3.98	5.85

(vacuum) from its initial value and an increase was seen in reducing sugar and total soluble solids (68.51 and 67.77, 0.17 and 0.12, 164.84 and 168.03 mg. 5.87 and 5.85, 4.95 and 3.98g. per cent and 11.66 and 12.17 °brix) compared to ordinary packing (V₂). Similar results were obtained in pomegranate in shrink wrapping (Shantha Krishnamurthi, 1993).

During storage moisture loss occurred due to the transpiration and respiration of fruits. Wax or oil film treatments reduce the moisture loss by closing the small pores. Adsule *et al.*, (1983) revealed that moisture content was decreased in control as compared to fruits stored in LDPE bags. Similar results were observed in this study. According to Kerla *et al.*, (1983) there was an upward trend in TSS during storage studies of guava as observed in the present study. The TSS generally increased when moisture loss increased. Vitamin-C content decreased during storage depending upon the length of period. Balakrishna *et al.*, (1994) revealed that vitamin-C content of guava increased upto six months after storage and declined thereafter. Generally reducing sugar increased during storage because total sugars are converted into reducing and non reducing sugars. According to Singh *et al.*, (1984) there was higher gain in the buildup of reducing sugar in the fruits during storage as observed in this study. Sensory evaluation of stored fruits scored higher values.

Summary

Among packaging and pretreatment, vacuum packaging

and waxing in polyethylene bag (200 gauge thickness) were found to maintain most of the quality parameters. No difference was found among the temperature levels. Since there is an increase in shelf of product studied through vacuum packing, this technology can be taken up by women as an entrepreneurship project.

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Studies on Developing and Evaluating Product from Egg Milk Mixture for Human Consumption

by
R.C. Keshri, M.S. Chinnan, Y.C. Hung and C. Park

Abstract

Experiments were conducted to develop formulations and processing technique for a beverage incorporating milk, egg, mango pulp and sugar. The contents (either 60% buttermilk/skim milk/whole milk, with 15% chicken whole egg liquid, 15% mango pulp and 10% sucrose) were stirred at a medium speed in the Hobart Mixer for 2.5 minutes, homogenized at 2000 psi and pasteurized at 63.5° C for 3.5 minutes using the Armfield FT74 UHT Plate Heat Exchanger Unit. The beverages were stored in glass bottles at ambient (25° C) and refrigerated (5° C) temperatures up to two weeks. Various parameters to assess quality changes were recorded at 1,4,7,11 and 14 days.

Formulations significantly ($p < 0.05$) affected the colour values of L, b, delta E, pH and viscosity. Storage temperatures had significant effect on L, a, b, pH and viscosity values. Storage days had however, significant effect only on pH values. The beverages containing buttermilk, skim milk and whole milk respectively had 74.74, 76.68 and 75.53% moisture and 2.06, 2.02 and 5.26% fat. The nitrogen contents in that order were 0.8057, 0.7778 and 0.7685 percent. Formulation with skim milk had significantly ($p < 0.05$) higher moisture content whereas, the formulation with whole milk had significantly higher fat content. The nitrogen contents did not differ significantly between the formulations. The total aerobic plate count (cfu) showed tremendous growth of microorganisms at ambient temperature and suggested storage of the beverages only at the refrigerated temperature for safe consumption. Beverage containing buttermilk had the least microbial population and growth. Salmonella was not detected in any of the samples.

Introduction

Milk, eggs and fruits are the popular foods consumed throughout the world. They have high biological value. Easy availability, modest cost and popular taste appeal for children, teenagers and elderly persons are some of the advantages in taking such foods. However, there are limited number of food products prepared from egg, milk and fruits. Developing a product from the mixture of egg, milk and fruits can meet the requirement of individuals needing proteins, carbohydrates, fats, vitamins and minerals. Individuals and institutional consumers (schools, hospitals, nursing homes, restaurants, air-lines and fast food establishments) are really interested these days in serving ready to eat, convenient products as they find it more time saving and a means of providing variety in meals. Balanced food is also sometimes required to be eaten 'on-the-run' by those who often skip their breakfast. A complete food has to be prescribed to workers or the athletes keeping in mind their nutrient allowances and considering their physical activities at the highest levels.

One of the food products combining egg and milk mixture is the eggnog. This product is quite common in the western countries. The eggnog consists of eggs beaten up with sugar, milk and sometimes alcohol. Anderson and

Jackson (1951) observed large variations in the contents of eggnog. Need for Federal Standards of eggnog drink was felt in the U.S.A. Nielsen (1969) and regulatory agencies in some states suggested to have a minimum of 3% fat and 0.5% of total egg solids in the product. Preparation of eggnog using commercial flavourings and their evaluation were reported by Cardwell *et al.*, (1969). Hedrick (1969) provided brief information on dried eggnog. Aseptic canning of eggnog drink suitable for use in hospitals and nursing homes has also been suggested (Anon., 1970). Extension of shelf-life of eggnog through better processing and packing techniques has been emphasized (Aggarwal, 1975, Anon., 1981). Quality of non-alcoholic commercial eggnog has been estimated by Hankin *et al.*, (1980). Loewenstein (1982) has briefly stated problems encountered in production of eggnog. A Japanese food processing company was granted license for manufacturing of a beverage containing egg, milk, sugar and vanilla in New Zealand (Evatt, 1985). Lieb (1988) has suggested evolving new formulations and introducing new brands of eggnog as a non-alcoholic beverage to the market of food industry.

Baker *et al.*, (1967) developed a beverage containing apple juice, eggs, and sugar. There are some other reports on the incorporations of fruits to milk beverages such as apple pulp and cherry (Hedrick *et al.*, 1968, Hedrick, 1969). It has been further suggested that numerous other fruits can be used if added in a comminuted form sufficiently fine to stay in suspension in the milk. Balasubramanyam and Kulkarni (1991) have tried addition of mango pulp in preparation of yoghurt. Commercial manufacturing of pasteurized mango fruit flavoured milk based beverage has been reported by A-Haq and Mohyuddin (1992). Studies on carbonated beverage based on mango pulp have been reported by Islam *et al.*, (1993). Introduction of fruit flavoured milk as dairy beverage has been advocated by Behrendt (1996). Milk-fruit beverages incorporating cultured milk have been discussed by Mann (1996). However, information on the formulations and manufacturing procedure of the beverage containing milk, eggs and mango pulp has not been cited in the literature.

The present work was, thus undertaken to develop the formulations of a beverage containing milk, egg, mango pulp and sugar. In addition, studies to investigate changes in the product's quality during processing and storage were planned.

Objectives

The objectives of the present investigation were to evaluate formulations and processing technique in developing a beverage based on milk, eggs, mango pulp, and sugar and examine quality changes occurring during storage of the beverage at ambient and refrigerated storage temperatures.

Materials and Methods

Preliminary investigations were first carried out on the eggnog prepared in the laboratory using the formulations from different sources (Anderson and Jackson, 1951; Anon., 1976). The beverage so prepared was stored at refrigerated temperature (5° C) up to three weeks; and the pH, colour, density, total solids and viscosity were determined. Subsequently, a new formulation was

developed containing either 60% fluid milk (0.5% fat or 4% fat) or cultured low fat butter milk, 15 % whole egg (chicken) liquid, 10% sucrose and 15% mango pulp. Each treatment was formulated for 8 kg sample size. Shell eggs, sugar, salt, skimmed milk powder and vanilla, was procured from the local super market (Kroper Foods, GA) and mango pulp from an India grocery store (Riverdale, GA). Mango pulp for preliminary trials was the Ratnakar brand (Ratnakar Canning Industries, Maharashtra, India), whereas for the experimental trials it was the Kesar brand (canned and exported by Anil & Co., Bombay, India). Sugar was first mixed with milk following which mango pulp and whole egg liquid were added. Carrageenan (FMC Corporation, Food Ingredients Divison, Philadelphia, PA) was added at 0.05% w/w level to the formulation containing skimmed milk only, while cool. Mixing took place in Hobart Mixer at medium speed for a period of 2.5 minutes. Filtration of mixture was facilitated with the help of a fine stainless steel wire mesh. The mixture was then homogenized at 2000 psi pressure in a single stage homogenizer. Subsequently, pasteurization was carried out using the Armfield FT74 UHT Plate Heat Exchanger Unit having FT60 and 61 Heating and Cooling System at 63.5°C with the holding time of 3.5 minutes (USDA, 1969). The beverage was stored in sterilized glass bottles at ambient (25°C) and refrigerated (5°C) temperatures and various observations were recorded twice a week.

pH was recorded using a digital pH meter (Model Corning 440, UL Laboratories, UK) calibrated with the known standard. Colour of the samples was measured with the colourimeter (Model XL 800, Pacific Scientific Co. Gardner Laboratory Division, Bethesda, MD). The instrument was calibrated with white plaque (L, a and b values at +94.11, -0.99 and +0.89, respectively) and the yellow plaque (L, a and b values at +61.09, +63.30 and +43.91, respectively). Viscosity measurements were recorded through a digital Viscometer at a constant speed of 1.5 rpm using spindle number 18 (Model DV II, Brookfield Engineering Laboratories, Inc., Stoughton, MA, USA), in case of experimental trials and 00 for the preliminary trials. Density of the beverage samples (10 ml) was determined as weight per unit of volume (g/ml). Moisture was determined by drying the samples at 100°C in a hot air oven until the constant weight was obtained. Nitrogen values were estimated with the help of Leco FP-2000 (St. Joseph, MI) using programme No. 2222 and fat was estimated using the Goldfish extractor (Model 3500, Laboratory Construction Co., Kansas City KS).

Samples were supplied for microbiological examination for enumeration of total plate count and salmonella by standard laboratory technique.

All reported values represent the means of two replicate trials. Samples in bottles were drawn randomly for recording of observations in duplicate each time. Data was analysed with analysis of variance techniques using PROC GLM of Statistical Analysis System (SAS, 1990) to determine the main and interaction effects. Significant differences between treatment means were determined using the least significant difference test.

Results and Discussion

A total of nine formulations were tried (Table 1). Preliminary investigations were carried out with the recipes A,B,C,D,E and F. Each recipe was prepared for one kg weight. Ingredients were mixed manually. Cooking was done between temperature range of 70 and 80°C for 15 minutes with constraunt stirring. After preparation, the samples were cooled to room temperature at 25°C and subjected to informal sensory evaluation. The samples from recipes

Table 1.

Ingredients (% Wt.)	FORMULATIONS*								
	A	B	C	D	E	F	G	H	I
Milk based fluid	84.58	76.6	70	70	70	65	60	60	60
Whole egg liquid	5.51	14.4	15	15	15	15	15	15	15
Sugar	9.57	8.5	9.7	9.7	9.7	10	10	10	10
Salt	0.09		0.1	0.1	0.1				
Vanilla essence	0.21	0.4	0.4	0.2	0.2				
Skim milk powder				5	5				
Mango Pulp						10	15	15	15

*A & G skim milk; B, C, E & H whole milk, D, F & I cultured buttermilk

Table 2. Results of Preliminary Investigations

Formulation	Days	Density	Total	pH	Viscosity	Colour		
		g/ml	solids %		cps	L	a	b
A	0	1.14	25.01	6.82	18.57	77.67	-6.69	13.19
	7			6.83	19.00	70.43	-6.70	8.23
	14			6.86	19.79	67.12	-6.83	9.64
	21			6.84	18.40	65.85	-7.83	8.15
	0	1.14	26.27	7.02	50.00	77.26	-5.42	14.68
B	7			7.08	42.63	84.56	-6.42	17.16
	14			7.13	38.17	89.09	-7.26	21.40
	21			7.18	37.08	87.38	-5.95	18.65
	0	1.14	24.11	6.60	7.58	77.40	-5.12	19.20
	7			6.80	4.60	79.92	-6.12	17.21
C	14			7.00	5.68	89.12	-7.72	19.55
	21			6.93	5.65	88.53	-6.41	19.18

A,B and C were stored at refrigerated temperature (5°C) for further studies on 7, 14 and 21 days to assess the suspension stability and other changes (Table 2). Although there were no major changes in colour, pH and viscosity, the formulations needed further improvement. Formulation A prepared with skimmed milk lacked desired quality such as proper thickness and mouthfeel. It was also poor in flavour. Therefore, to improve upon consistency and flavour of the beverage, incorporation of carrageenan and addition of butter milk was tried. Incorporation of powder milk to the formulations (Recipes C, D, & E) was not very encouraging because of dry and bland taste. So, ultimately, mango pulp (Recipe F) was considered as a replacer of skimmed milk powder as a thickener and also as an additive to good flavour. Satisfactory results were obtained when mango pulp was increased to 15% level (Recipe G). The experimental trials were conducted twice with only recipes G,H and I, weighing 8 kg weight per treatment, each time. The results of these are presented in Table 3 to 6. Formulations significantly ($p<0.05$) affected the L, b, delta E, pH and viscosity values. Storage temperatures significantly affected L, a, b, pH, and viscosity values, whereas, storage days had significant effect only on pH. Interaction between formulation and storage were found significant for L, b, pH and viscosity values, whereas, interaction between storage and days was significant for pH only.

The reflected light determines the colour and appearance of food materials. The L, a and b values have been respectively reported to represent the lightness, the degree of redness or greenness (a), and the degree of yellowness or blueness (b). These instrumental colour measurements correspond to the visual assessment of the food colour. The human perception of the colour as hue describes the visual sensation of the colour (Mallikarjunan and Hung, 1997). The differences in the colour between two stages is often calculated as delta E. In the present beverages, the pigments responsible for colour have been contributed mainly from milk, egg yolk and mango pulp. The colour of

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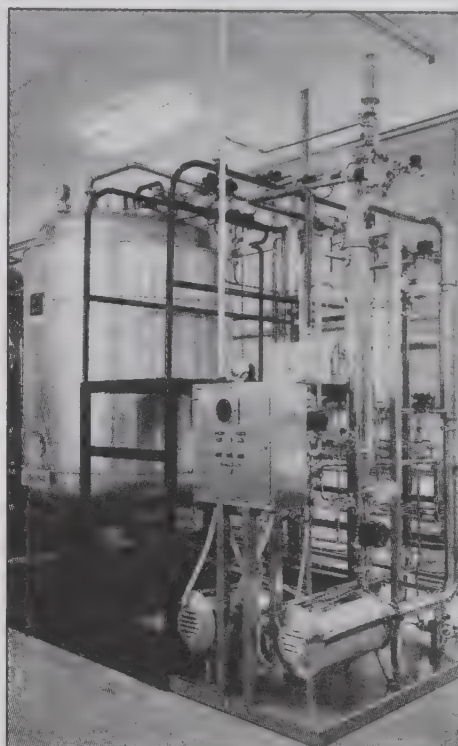
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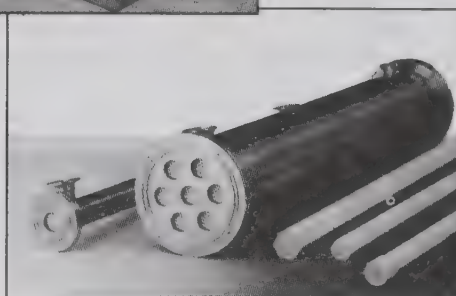
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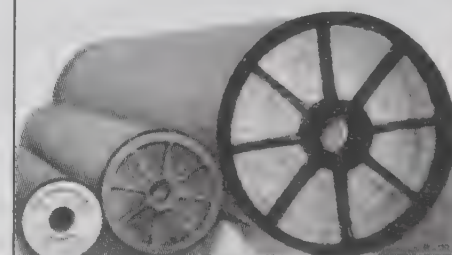


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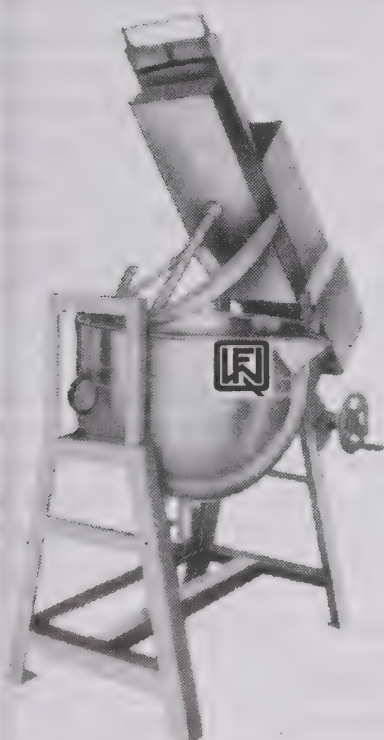
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Table 3. Mean values of Colour, pH, and Viscosity

Formulation	Storage	Day	Colour values				pH	Viscosity
			L	a	b	Angle Delta E		
Buttermilk	Ambient	1	89.03	-1.94	39.81	-1.52	39.37	4.90
Buttermilk	Ambient	4	88.36	-1.39	39.52	-1.54	39.07	4.86
Buttermilk	Ambient	7	87.40	-1.89	39.03	-1.52	38.74	4.85
Buttermilk	Ambient	11	87.60	-1.03	37.86	-0.76	37.57	4.90
Buttermilk	Ambient	14	87.90	-1.63	38.80	-1.53	38.42	4.59
Buttermilk	Refrig.	1	87.87	-3.31	38.57	-1.49	38.40	4.83
Buttermilk	Refrig.	4	89.11	-1.55	39.54	-1.53	38.99	4.88
Buttermilk	Refrig.	7	89.01	-1.73	39.17	-1.53	38.64	4.87
Buttermilk	Refrig.	11	88.83	-1.16	39.13	-0.76	38.62	5.05
Buttermilk	Refrig.	14	88.38	-2.26	38.42	-1.50	38.02	4.92
Skim milk	Ambient	1	77.51	-3.23	37.70	-1.45	40.72	6.15
Skim milk	Ambient	4	82.51	-0.74	40.51	-0.77	41.30	4.94
Skim milk	Ambient	7	80.80	-1.68	40.04	-1.53	41.37	4.94
Skim milk	Ambient	11	79.01	-1.49	38.32	-1.53	40.93	5.04
Skim milk	Ambient	14	81.92	-1.74	40.94	-1.53	41.88	4.89
Skim milk	Refrig.	1	73.63	-4.23	36.00	-1.45	40.85	6.54
Skim milk	Refrig.	4	70.79	-3.66	34.63	-1.46	41.13	6.61
Skim milk	Refrig.	7	70.26	-3.43	33.79	-1.47	40.78	6.64
Skim milk	Refrig.	11	69.72	-2.91	33.62	-1.48	40.95	6.69
Skim milk	Refrig.	14	67.81	-3.91	33.41	-1.45	41.95	6.62
Whole milk	Ambient	1	85.51	-2.66	38.83	-1.50	38.98	6.17
Whole milk	Ambient	4	87.29	-0.58	40.44	-1.56	40.14	4.90
Whole milk	Ambient	7	86.70	-1.34	39.72	-1.54	39.55	4.92
Whole milk	Ambient	11	86.31	-0.59	40.03	-0.77	39.92	4.90
Whole milk	Ambient	14	84.70	-1.61	39.21	-1.53	39.65	4.89
Whole milk	Refrig.	1	83.20	-3.99	36.68	-1.46	37.60	6.56
Whole milk	Refrig.	4	83.08	-3.07	36.77	-1.49	37.61	6.61
Whole milk	Refrig.	7	81.01	-4.01	34.96	-1.46	36.65	6.63
Whole milk	Refrig.	11	81.68	-3.42	35.65	-1.47	37.02	6.63
Whole milk	Refrig.	14	81.64	-3.04	35.89	-1.49	37.23	6.39

fluid milk is caused by the scattering of light by the fat globules, casein micelles, colloidal calcium phosphate and to some extent by the pigments carotene and riboflavin (Harper and Hall, 1976). The naturally occurring pigments in chicken yolk are mainly xanthophylls, lutein and zeaxanthine (Stadelman and Cotterill, 1995). Presence of carotenoid pigments such as xanthophylls, B-carotene, B-cryptoxanthene zeaxanthene etc. have been reported in mango pulp (Cano and Ancos, 1994; Mercadante *et al.*, 1997). The various kind of interactions in these pigments due to the effects of formulations, storage temperatures and storage periods are responsible for the changes in the different values of colour components in the present study. Decrease in the L and b values and increase in a value during storage of mango drinks have been reported by Kalra *et al.*, (1991). However, Islam *et al.*, (1993) did not observe any significant change in colour in a carbonated beverage based on mango pulp.

pH values in the present studies were significantly lower in the formulation containing butter milk and also in samples stored at ambient temperature than those at refrigerated one. The pH values recorded in the raw butter milk in this study was as low as 4.49 and that of mango pulp was 3.52. The pH value of whole egg liquid was 7.93. The values slowly decreased with the days of storage. Anderson and Jackson (1951) have reported pH values of eggnog from 6.09 to 7.15 with the average of 6.48. The variation in pH values of food is due to the interaction of various solutes and solvents present in the system and also because of metabolism of micro organisms present in it (Azizi and Ranganna, 1993).

Viscosity values were found significantly higher in formulation containing butter milk followed by whole milk and then skimmed milk. The overall mean values of samples stored at ambient temperature were also higher than those of samples stored under refrigerated conditions. Obviously, these were because of the fact that the butter milk has higher viscosity values than whole milk and skimmed milk. Wider variations in values of viscosity from egg, milk and mango pulp have been reported. The various factors that greatly affect are concentration, temperature,

Table 4. Results of Anova for Colour, pH and Viscosity

Source	Degrees of freedom	F Values						
		L	a	b	Angle	Delta E	pH	Viscosity cps
TREATMENTS	21	26.39	2.47	2.84	1.05	1.97	24.62	55.71
Formulation (F)	2	205.24*	3.13	4.92*	0.14	14.89*	93.2*	355.09*
Storage (S)	1	69.41*	25.63*	29.55*	0.38	3.59	191.56*	271.47*
Day (D)	4	0.95	3.15	0.46	2.17	0.17	5.45*	1.61
F × S	2	32.55*	3.01	7.8*	0.14	2.79	39.6*	79.82*
F × D	8	0.16	0.10	0.11	1.34	0.19	1.32	2.73
S × D	4	1.03	0.12	0.46	0.41	0.05	6.9*	0.07

* Significant at 5%

Table 4A. Results of Anova for Colour (L), pH and Viscosity by Variable - Storage

Source	Degrees of freedom	F Values					
		Ambient			Refrigerated		
		L	pH	Viscosity	L	pH	Viscosity
TREATMENTS	14	7.05*	4.05*	8.41*	34.89*	99.84*	
Formulation (F)	2	43.18*	4.08*	47.43*	237.92*	254.02*	692.49*
Day (D)	4	0.99	8.69*	0.69	1.33	0.57	1.39
F × S	8	1.05	1.72	2.52	0.91	0.26	0.91

* Significant at 5%

Table 4B. Mean Values of Parameters for each formulation

Formulation	Ambient Storage			Refrigerated Storage		
	L-Value	pH	Viscosity	L-value	pH	Viscosity
Butter milk	88.05a	4.82b	934.35a	88.64a	4.91b	942.85a
Skim milk	86.10b	5.19a	570c	70.44c	6.62a	198.85b
Whole milk	80.35c	5.15a	727.5b	82.12b	6.56a	173.24b

state of dispersion of solid components etc. (Harper and Hall, 1976). It has also been reported that casein in milk contributes more to the viscosity than fat found in normal milk (Rogers, 1928). The temperatures also greatly affect the viscosity values in milk and milk products. For example, viscosity of ice cream has been reported to be reduced by aging. This effect is due to the aggregation of clumps resulting in structure formation and it is also a function of fat content. The formulation containing skimmed milk in the present study incorporated carrageenan at the rate 0.05%. Effect of such enhancers is two folds. First they may improve thickening by increasing the tendency of the fat to clump and by increasing adsorption upon the fat surface. Secondly, their action may be upon the milk solids not fat, causing a slight aggregation of the calcium caseinate particles or a partial coagulation. This action would increase resistance, thereby producing a more viscous mixture. In this study the higher viscosity values in the formulations thus appear due to the addition of mango pulp which has been reported to have greater than 7000 cps (Gowda and Ramanjaneya, 1994) and 15040 to 70464 cps (Pinera *et al.*, 1995).

The proximate composition (Table 5) of the beverages differed significantly in respect of moisture and fat contents. Formulation with skimmed milk had higher values followed by whole milk. The fat content was significantly higher in the one containing whole milk. There was no significant variation in the nitrogen contents of the three formulations.

Table 5. Proximate Composition of the Product

Parameters	Formulations		
	Buttermilk	Skim milk	Whole milk
Moisture (%)	74.74b	76.68a	75.53b
Fat %	2.06b	2.02b	5.26a
Nitrogen (%)	.8057a	.7778a	.7685a

The total aerobic plate counts were significantly lower in formulation containing butter milk. The growth was very

Table 6. Total Plate Count Enumerated from the Product

Formulation	Storage temp.	Days of Storage					
		0	1	4	7	11	14
Butter milk	Ambient	0.78	0.70	2.34	3.76	5.88	4.72
	Refrig.		0.78	1.46	1.04	1.43	1.08
Skim milk	Ambient	1.53	5.70	7.07	5.92	6.66	7.30
	Refrig.		2.11	2.10	2.81	3.82	3.49
Whole milk	Ambient	2.63	5.70	6.68	6.28	5.59	6.84
	Refrig.		2.79	2.89	2.57	3.42	2.83

high in samples stored at ambient temperature than refrigerated one. The number increased with the passage of storage time. Salmonella was not detected from any of the samples. It is therefore, inferred that the beverage in question as such has the safe storage life ONLY in refrigerated condition and not at the ambient temperature. Sugar and acid tolerant microorganisms causing spoilage in foods containing mango have been enumerated by Kanekar *et al.* (1992) and O Connor-Shaw *et al.* (1995). Drinks containing mango subjected to aerobic plate count by Kalra *et al.* (1991) showed the presence of fungi, yeast and bacteria but the isolated microorganisms were non-pathogenic.

Summary

Egg, milk, mango pulp and sugar containing beverages in three different formulations were developed and compared for some of the quality parameters at ambient (25°C) and refrigerated temperatures (5°C) up to a period of two weeks. Effects of formulations, storage temperatures and storage days were found significant ($p < 0.05$) for colour, pH and viscosity values. Moisture and fat percent also differed significantly in formulations whereas, nitrogen percent did not. Total plate count (cfu) increased tremendously in samples stored at ambient temperature and suggested safe storage of the beverages at refrigerated temperature only. The growth of microorganisms was lowest in the formulation containing butter milk when compared with those based on skim milk and whole milk.

Acknowledgement

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Prevalence of Enterococci in Milk and Milk Products

by
T. Kar, T.K. Maity and A.K. Misra*

Summary

One hundred and forty six samples of milk and milk products were examined for the presence of enterococci, using modified Citrate Azide Agar Medium. Enterococcal counts were highest in chhana and lowest in pasteurized milk samples. Total bacterial counts were generally high in dried milk samples. Total bacterial counts were generally high in chhana, paneer and in frozen desserts as compared to dried milk products. 20.9% dairy samples contained $10^1 - 10^2$ c.f.u./ml org. of the sample. Only 9.5% of the samples had enterococcal counts of more than 10^6 c.f.u./gm. Overall 71.9% of dairy products were contaminated with enterococci.

Introduction

The universal practice of allowing the calf to suck a little milk before milking, the practice of milking the animal on streets for door to door delivery, the dirty udder and unwashed flanks, filthy condition of the stable, polluted water supply, uncleaned utensils, the unwashed and contaminated hands of the milker, his clothes and his sanitary habits, defective transport arrangements, the warm climate of the country, improper cleaning and sanitation of dairy equipments, the unhygienic conditions of milk shops, the lack of suitable technical and educational facilities, wide-spread adulteration, the ignorance and indifference of persons generally engaged in the dairy product trade are only a few of the many sources and causes of enterococci contamination of milk and milk products. Recently enterococci have been receiving greater attention along with coliforms in dairy products. This is due to the importance of enterococci as indicator organisms to predict unhygienic conditions of production and processing. Enterococci, which causes occasional food spoilage were originally considered harmless from the public health point of view but there is sufficient evidence to show that some strains of enterococci may be responsible for food poisoning of milk products under certain conditions^{1,2}. Enterococci can multiply in milk and milk products under favourable conditions and this quality alongwith their ability to resist unfavourable environmental conditions is the main reason for their high incidence in milk products. The present investigation is a systematic attempt to estimate and analyze different types of dairy products produced and distributed in Calcutta and its suburbs for the enumeration and isolation of enterococci. Sixteen samples of other materials e.g. human and animal faecal matter, dairy water supplies and hand washing of dairy plant personnel were also examined for enterococci in order to detect likely sources of entry of these organisms.

Materials and Methods:

Representative samples of raw milk, pasteurized milk, paneer, chhana, kulfi, ice-cream, butter, skim milk powder and infant food were collected according to APHA³. The detailed distribution of the samples is given in Table 1. The other samples, which were tested in the survey, included swabs from the hands of dairy personnel, water used in dairies, and human and bovine faeces. The distribution of these samples is given in Table 3. All samples were examined for total bacterial and enterococcal counts. Total bacterial counts were determined on yeast extract tryptone dextrose agar³ and modified citrate azide agar (CAA) as described by Saraswat *et al.*⁴, was used to isolate and enumerate enterococci.

Results:

Analysis of 146 samples of milk and milk products have shown that the overall incidence of enterococci was 71.9 % (i.e. 105 samples out of 146). The incidence of enterococci positive samples of milk and milk products is shown in Table 1. All the samples of chhana, paneer and kulfi contained enterococci as did 86.6% of raw milk, 80% of ice-cream and 76% of pasteurized milk samples. Butter showed 50% whereas the lowest incidence (40%) is evidenced in both SMP and infant foods. The average total bacterial count for different samples of milk and milk products ranged from 2.12×10^3 c.f.u./ml (Pasteurized milk) to 5.6×10^8 c.f.u./gm (Chhana). Enterococci counts were between 43 c.f.u./ml (Pasteurised milk) to 8.9×10^5 c.f.u./gm c.f.u. (Chhana). There was no clear correlation between total bacterial counts and enterococcal counts although chhana, kulfi and paneer samples showed higher total bacterial counts and also contained a significantly higher number of enterococci.

Table 1: Total bacterial and Enterococcal Counts of Milk and Milk Products.

Type of Sample	No. of Samples Tested	No. of enterococcal positive samples	Total Plate Count			Enterococcal Counts		
			Max. (cfu/ml or gm)	Min. (cfu/ml or gm.)	Av. (cfu/ml or gm)	Max. (cfu/ml or gm)	Min. (cfu/ml or gm)	Av. (cfu/ml or gm.)
Raw Milk	30	26	2.5×10^6	1×10^5	18.84×10^5	18.1×10^3	210	11.020×10^3
Pasteurized Milk	25	19	4.3×10^4	2.2×10^3	21.2×10^3	99	7	43
Chhana	12	12	9.6×10^7	36×10^6	56×10^7	42×10^5	89×10^4	19×10^5
Kulfi	7	7	6.7×10^7	9.2×10^6	4.5×10^7	2.1×10^4	5×10^3	1.1×10^4
Butter	10	5	10.1×10^4	7.2×10^3	4.2×10^4	7×10^2	30	2.1×10^2
Ice-cream	10	8	7.8×10^5	1.5×10^5	3.1×10^5	2.4×10^3	6×10^2	1.8×10^3
Paneer	12	12	42×10^7	3×10^6	8.5×10^7	27×10^4	21×10^3	8×10^4
Skim Milk Powder	20	8	1.1×10^5	28×10^3	43×10^3	220	30	172
Infant Food	20	8	62×10^3	14×10^3	30×10^3	130	12	51

When samples, were grouped according to enterococcal counts (Table 2) it has been found that 20.9% contained $10^1 - 10^2$ c.f.u./ml or gm, 19.5% contained $10^2 - 10^3$ c.f.u./ml or gm, 17.1% contained $10^3 - 10^4$ c.f.u./ml or gm and 16.1% contained $10^4 - 10^5$ c.f.u./gm. Only ten chhana samples (9.5%) showed more than 10^6 c.f.u./gm. Pasteurized milk samples had shown lowest enterococcal count of $<10^2$ c.f.u./ml whereas chhana samples contained enterococcal count $> 10^5$ c.f.u./gm.

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Table 2: Percent distribution of Milk and Milk Products on the basis of Enterococcal Isolates

Sample No.	Colony forming units per ml. or gm (10g)	Raw Milk	Pasteurized Milk	Paneer	Chhana	Kulfi	Butter	Ice-cream	Skim Milk Powder	Infant Food	Total No. of samples	Percent
1	0 - 1	0	8	0	0	0	0	1	1	3	12	11.4
2	1 - 2	0	11	0	0	0	2	0	5	4	22	20.9
3	2 - 3	13	0	0	0	0	3	1	2	1	20	19.5
4	3 - 4	8	0	0	0	3	0	7	0	0	18	17.1
5	4 - 5	5	0	8	0	4	0	0	0	0	17	16.1
6	5 - 6	0	0	4	2	0	0	0	0	0	6	5.7
7	7 - 8	0	0	0	10	0	0	0	0	0	10	9.5

Table 3: Analysis of sources other than Milk and Milk Products for Total Bacterial and Enterococcal Counts.

Type of Sample	Sources	No. of Samples	Total Bacterial Count (cfu/ml or gm.)			Enterococcal Counts (cfu/ml or gm.)		
			Max.	Min.	Av.	Max.	Min.	Av.
Swabs from the hands of Dairy personnel	Organized Dairy	8	5×10^4	3×10^3	14×10^3	2.8×10^3	24	670
Dairy water	Organized Dairy	3	1.5×10^5	11.2×10^3	59,733	330	14	151
Faecal matter (Human)	Milk handlers	2	231×10^7	47×10^7	139×10^7	89×10^4	60×10^3	475×10^3
Faecal matter (Cattle)	Milch Animals	3	87×10^7	21×10^7	50×10^7	74×10^4	16×10^4	54×10^4

Results of the analysis of non-milk samples analysed for total bacterial counts and enterococcal counts are shown in Table 3. Faecal material (both from human and cattle) was the most significant source of enterococci. Hands of the dairy personnel and dairy water also contributed a lot in increasing the enterococcal counts of milk products.

Discussion:

The role of enterococci as indicators of faecal contamination in dairy products has been widely recognized^{5,6}. In addition, some strains of enterococci are capable of producing food poisoning because of their ability to produce toxic metabolites in foods, thereby making them potentially harmful from public health point of view.^{1,2,7}

The incidence of enterococci in milk and milk products in the present study is consistent with the observation of the other workers. Jicinska *et al.*⁸ encountered the incidence of

enterococci in whole milk, skim milk powder and infant food. In another study Abo - Elnaga⁹ observed the presence of enterococci in boiled milk and their involvement in the spoilage of the product. The results of the present investigation showed that enterococci were more or less invariably associated with milk and milk products their number being high in samples of chhana, paneer kulfi and raw milk. The products like chhana, paneer and kulfi are indigenously pre-

pared where the producer's knowledge of hygiene is very limited and probably this may be the reason for high enterococcal count of these products.

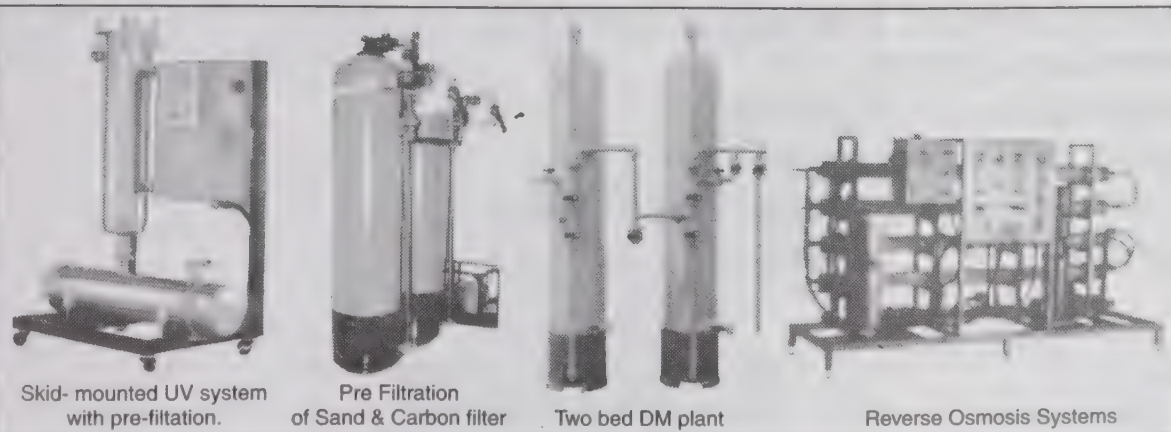
The sample like pasteurized milk, SMP, infant food and butter showed low enterococcal count which may result from heat treatment or may be indicative of better hygienic condition during manufacture.

Faecal matters contained highest number of enterococci and enterococci in hand washing and dairy water may originate from faecal condition.

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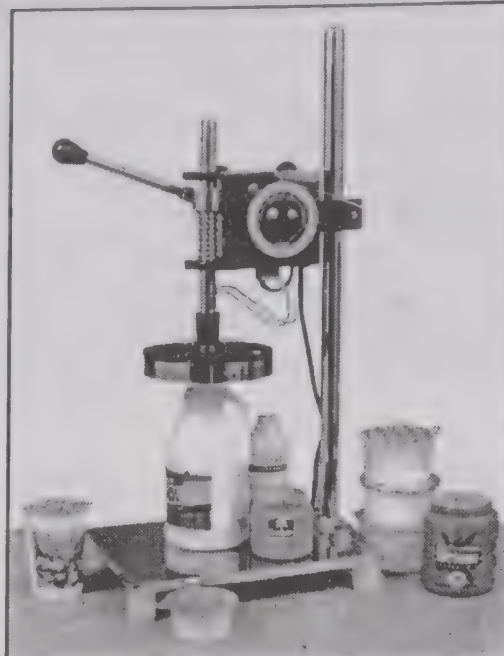
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Preparation and Quality Evaluation of Processed Products from Seabuckthorn (*Hippophae Rhamnoides* Lin.) Berries

by
A. S. Chauhan, M. N. Rekha, R. S. Ramteke and W.E. Eiperson

Abstract

Seabuckthorn (SBT) is a Himalayan thorny shrub grown wild in the valley of Spiti of Himachal Pradesh. At present seabuckthorn is cultivated in 500 hectares in the valley and the area is being increased continuously. The shrub yields small sized orange red coloured berries which have been shown to possess several medicinal properties. The berries have potential for processing into various types of value added products. The seabuckthorn berries are rich in several constituents like ascorbic acid, carotenoids and flavonoids etc. Conditions were standardized for the extraction of SBT juice, the yield of which varies from 65 - 68 % and has an attractive orange red colour. Products like Ready-to-Serve beverages, squashes, blended beverages of seabuckthorn juice with orange, apple and papaya juice and mixed fruit jam along with orange, apple and papaya pulp in different combination were prepared. The products when subjected to sensory evaluation showed acceptable qualities with respect to combination of 50:50, 60:40 and 70:30 ratios both for blended beverages as well as jam for each of the fruit studied in terms of taste and flavour. The results showed that SBT could be utilized successfully for commercial preparation of various value-added products, which will have both, internal as well as export market.

Keywords

Blends of Seabuckthorn with orange, apple, papaya juices, processed products, quality evaluation.

Introduction

Seabuckthorn (*Hippophae rhamnoides* Lin.), a hardy deciduous shrub with yellow or orange berries, is attracting considerable attention mainly for its medicinal value and great economic potential (Li and Schroeder 1996). Seabuckthorn is a unique plant currently being domesticated in several parts of the world. The plant is reputed to have considerable medicinal value being useful for the treatment of skin disorders resulting from bed confinement, stomach and duodenal ulcers, cardiovascular diseases and perhaps growth of some tumors (Li and Wang 1998). Spiti valley in the Lahul and Spiti district of Himachal Pradesh is mainly a cold desert where only a few plant species grow and seabuckthorn is one among them. Seabuckthorn belonging to family *Elaegnaceae*, grows naturally in Russia, Germany, China, France, Romania, Central Asia, Nepal, Pakistan, Bhutan and India. In India, Lahaul and Spiti have very rich resources of Seabuckthorn at an altitude of 2500 - 4300 meters above mean sea level (Singh *et al.*, 1998).

The fruit is the main component of value, although the leaves are occasionally made into seabuckthorn tea. The two main sources of valuable products are derived from the berries, juice from the fresh tissue and seed as a single

seed from each berry. The juice provides a nutritious beverage, high in suspended solids and very high in vitamin C and carotenes (Tom Beveridge *et al.*, 1998). The fruits can be harvested during September or October and a wild plant bears 1-2 Kg of fruit in a year. However, exotic high yielding varieties of Seabuckthorn produce 10-15 Kg of fruits per plant, the total yield being 30-35 tonnes per hectare (Singh 1998). The Seabuckthorn berries are rich sources of several constituents like ascorbic acid, carotenoids, microelements, flavonoids etc. Besides colour, seabuckthorn indicates encouraging potential for processing the berries into value added products (Rongsen 1992).

Vitamin - C (ascorbic acid) enriched value added products play key role in human nutrition (Chauhan *et al.*, 1998). Therefore, nutritionally enriched products such as beverages and jams can be manufactured from Seabuckthorn to provide extra nutritional health attributes (Mihelic and Vajic 1969; Heilsher and Lerber, 1996). Considerable amount of work has been carried out on the preparation of various value added products from Seabuckthorn grown in countries like China. There is considerable variation in the chemical composition among Seabuckthorn varieties. Hardly any work has been done on the variety grown in the Lahaul & Spiti valley of Himachal Pradesh. Therefore, in order to ascertain the economic utilization of this variety, studies were under taken to prepare various value added products from Seabuckthorn berries. Blending could lead to the production of delightful and delicious beverages and jam with improved sensory qualities having high nutritive value. In another way judicious blending with other fruits might be useful for the removal of astringency from the Seabuckthorn juice/pulp.

Materials and Methods

Raw material:

The fresh berries of Seabuckthorn packed in ventilated polythene bags and sulphited juice brought from Kaza town (Lahaul & Spiti valley) of Himachal Pradesh by road/air to reach Mysore within two days time for a brief period of 1-2 days before taken for processing.

Extraction of Seabuckthorn juice:

Two methods of juice extraction were followed:

- The juice was extracted from Seabuckthorn berries by steaming the berries in a pressure cooker for 5 minutes to remove astringency, followed by squeezing of steamed berries through muslin cloth to get the clear juice.
- In another method, the berries were crushed in a mixer for 5 minutes and the pulp was passed through stainless steel sieve having 20-40 μ pore diameter, followed by filtration through muslin cloth.

Extraction of juice/pulp from other fruits:

Orange juice was extracted using screw type juice extractor. The apple juice was extracted using hydraulic press and pulp was obtained by using a kitchen blender.

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Preparation of processed products:

The seabuckthorn juice was blended with orange, apple and papaya juice at the ratio of 100:0, 90:10, 80:20, 70:30, 60:40 and 50:50 for making Ready-to-Serve beverage, squash. Similarly, the same formulation was used for the preparation of jam after judicious blending of seabuckthorn pulp with the pulp of orange, apple and papaya.

Chemical analysis:

Total soluble solids (°Brix) was determined using hand refractrometer (Erma Japan). The pH of the juice was determined using a digital portable pH meter. Titratable acidity and tannin were estimated as per the methods described by Pearson (1972).

The method of AOAC (1984) was followed for determination of reducing and total sugars. The 2,6 - dichlorophenol indophenol titration method described by Ruck (1984) was used for measurement of ascorbic acid (vitamin C) content.

Sensory evaluation:

A panel of 20 judges were selected from the laboratory to evaluate the blended beverages (RTS and squash) of seabuckthorn:orange, seabuckthorn:apple and seabuckthorn:papaya and similarly, the jams in terms of colour, flavour, after taste and overall acceptability using a 9-point hedonic scale reported by Piggott (1988). Numerical scores ranged from 9 (like extremely) to 1 (dislike extremely).

Data obtained were statistically analyzed using analysis of variance and Tukey's test. Student t - test was, however used for comparing juices from steamed and unsteamed Seabuckthorn juice (Piggott 1988) and significance was accepted at $P \leq 0.05$.

Results

The physico-chemical characteristics of Seabuckthorn berries is presented in Table 1. The berries have orange red colour and the size and weight varies from 5.38 mm to 5.42 mm and 210 to 235 mg respectively and also have higher content of ascorbic acid (509 mg/100g) as compared to other seabuckthorn varieties (Katiyar *et al.*, 1990).

Table 1. Physico-Chemical characteristics of fresh Seabuckthorn berries

Parameter	Value (range)
Physical	
Fruit	Small berry
Colour	Orange red
Diameter (mm)	5.38 – 5.42
Weight (mg)	210 – 235
Seed numbers	2 – 4
Chemical	
T.S.S. (° brix)	10 – 12
Acidity (as % citric acid)	1.72 – 1.95
Tannins (%)	0.24 – 0.30
Carotenes (µg/100g)	6808 – 6869
Ascorbic acid (mg/100g)	422 – 516
Total Sugars (%)	6.2 – 6.95
Juice Yield (%)	65 – 68
Residue (%)	25 – 29
Seed (%)	10 – 12

Seabuckthorn berries were subjected to juice extraction by steaming and non-steaming methods. There is a slight decrease in the chemical characteristics like total soluble solids, total sugars and titratable acidity (as % anhydrous citric acid) of seabuckthorn berries juice by steaming methods. This may be due to the condensation of water vapour which leads to dilution. However, a loss of 6.2% ascorbic acid was observed in steamed berries (Table 2). The nutritional value of seabuckthorn, orange, apple and

papaya juices are presented in Table 3.

Table 2. Chemical composition of Unsteamed and Steamed Seabuckthorn (SBT) berries juice

Chemical parameters	Unsteamed SBT berries	Steamed SBT berries
% T.S.S. (° Brix)	10.8 ± 0.0	9.2 ± 0.1
Total Sugars (%)	6.2 ± 0.1	6.1 ± 0.1
Ascorbic acid (mg/100g)	516 ± 0.1	484.6 ± 0.2
Titratable acidity (as % citric acid)	1.92 ± 0.0	1.76 ± 0.1
pH	2.56 ± 0.1	2.58 ± 0.1
Carotenes (µg/100g)	6808 ± 0.2	6803 ± 0.2
Tannin (mg/100g)	0.24 ± 0.1	0.20 ± 0.1
Juice Yield (%)	65 ± 0.1	68 ± 0.1

± Values Means Std. Dev. (triplicates)

Table 3. Nutritional value of Apple, Orange and seabuckthorn juice

Juice	Carotenes (mg/100g)	Ascorbic acid (mg/100g)	Tannins (%)
Apple	Traces	3.90 ± 0.1	2.50 ± 0.1
Orange	0.21 ± 0.0	40.80 ± 0.1	Traces
Papaya	0.24 ± 0.0	15.67 ± 0.1	Traces
Seabuckthorn	6.80 ± 0.0	516 ± 0.1	0.50 ± 0.1

± Values Means Std. Dev. (triplicates).

Comparative analysis of the chemical constituents of seabuckthorn juice with orange, apple and papaya juice showed that the seabuckthorn juice had higher levels of ascorbic acid and carotenes as compared to orange, apple and papaya. The nutritional characteristics of the blended beverages (RTS and Squash) and jams prepared from seabuckthorn, orange, apple and papaya juice/pulp, in terms of carotenes, ascorbic acid and tannin are presented in Table 4. The results revealed that the seabuckthorn (*Hippophae rhamnoides*) juice is a rich source of ascorbic

Table 4. Nutritional characteristics of the blended juice as RTS Beverage, squash and pulp as a jam

Product	Carotenes (mg/100g)	Ascorbic acid (mg/100g)	Tannins (%)
RTS Beverage			
Orange	0.035 ± 0.1	18.25 ± 0.1	Traces
Apple	Traces	0.39 ± 0.1	0.25 ± 0.1
Papaya	0.037 ± 0.1	15.6 ± 0.1	Traces
Seabuckthorn	1.30 ± 0.1	125.3 ± 0.1	0.085 ± 0.1
Papaya/ Seabuckthorn	1.81 ± 0.1	115.2 ± 0.1	0.026 ± 0.1
Apple / Seabuckthorn	0.34 ± 0.04	25.20 ± 0.1	0.38 ± 0.1
Orange/ Seabuckthorn	1.32 ± 0.1	118.08 ± 0.1	0.21 ± 0.1
Squash			
Orange	0.06 ± 0.1	18.36 ± 0.2	Traces
Apple	Traces	0.42 ± 0.1	0.48 ± 0.1
Papaya	0.07 ± 0.1	16.2 ± 0.1	Traces
Seabuckthorn	1.70 ± 0.1	208 ± 0.1	0.22 ± 0.1
Papaya/ Seabuckthorn	1.44 ± 0.1	62.14 ± 0.1	Traces
Apple/ Seabuckthorn	1.22 ± 0.3	38.80 ± 0.1	0.56 ± 0.1
Orange/ Seabuckthorn	1.53 ± 0.2	121.68 ± 0.1	0.23 ± 0.1
Jam			
Orange	0.10 ± 0.1	18.87 ± 0.0	Traces
Apple	Traces	1.75 ± 0.1	0.89 ± 0.1
Papaya	0.12 ± 0.1	17.81 ± 0.2	Traces
Seabuckthorn	2.72 ± 0.1	179.2 ± 0.1	0.36 ± 0.1
Papaya/ Seabuckthorn	1.84 ± 0.2	123.2 ± 0.1	0.28 ± 0.1
Apple/ Seabuckthorn	1.54 ± 0.3	113.2 ± 0.1	0.68 ± 0.2
Orange/ Seabuckthorn	1.62 ± 0.2	130.8 ± 0.3	0.34 ± 0.2

± Values Means Std. Dev. (triplicates)

acid and carotenoids but due to its exotic flavour and acidic taste, the judicious blending of seabuckthorn juice with other fruit juices and pulp is essential. This strongly supports the need for its exploiting and increased utilization.

The seabuckthorn juice was utilized for the preparation of various processed products like RTS blended beverages containing orange, apple and papaya; squash containing orange, apple and papaya and jam with orange, apple and papaya. The nutritive values of many of the products in terms of carotenoids, ascorbic acid and tannins were enhanced considerably (Table 4). The proportions at which the products were prepared was found to be sufficient enough to provide the required nutritional characteristics. The juice extracted from steamed seabuckthorn berries has resulted in a slight decrease (5.5%) in soluble solids. This decrease in soluble solids could be attributed to the precipitation of tannins and colloidal particles in the juice during steaming (Shacklad 1969). Some volatile acids might have escaped during steaming, thereby leading to the slight decrease in titratable acidity.

The seabuckthorn juice contained more ascorbic acid, carotenes and acidity (as % anhydrous citric acid) as compared to orange, apple and papaya. However, the contents of sugars (reducing and total) and soluble solids were lower in seabuckthorn juice as compared to orange, apple and papaya juice.

The judicious blending of seabuckthorn with orange, apple and papaya revealed that the chemical attributes of the selected blends of seabuckthorn juice with orange, apple and papaya (50:50, 60:40 and 70:30 ratio) for making Ready-to-Serve Beverage, squash and jam (15%, 25% and 45% of the blended juice/pulp) were found to be sufficient enough to explore the suitability of seabuckthorn juice for processed products. The soluble solids, reducing sugars

and total sugars increased in the blended seabuckthorn products like RTS beverages, squash and jam with orange, apple and papaya. These increases could be due to the higher content of these constituents in the orange, apple and papaya juice. Similarly, the pH increased in the seabuckthorn blended products with orange, apple and papaya but inversely, acidity decreased with the blending of orange, apple and papaya juice.

The ascorbic acid, carotenoids and tannins were decreased in seabuckthorn blended products with orange, apple and papaya and this was mainly due to the presence of lower content in orange, apple and papaya juice.

However, inspite of the decrease in the titratable acidity and flavour but increase in the content of ascorbic acid of the blended processed products (RTS beverages, squash and jam) at least at the ratio of 50:50, 60:40 and 70:30 for RTS, squash and jam were most preferred by the panelists but they would no doubt be very good sources of ascorbic acid (Table 5).

Sensory Evaluation

Table 5. Result of Tukey's test on the after taste of blended and un-blended juices/pulp as a RTS beverages, squash and jam

Blended ratios (SBT: Orange/apple/papaya)	± Mean standard error (SE)		
	(RTS Beverage)	(Squash)	(Jam)
50 : 50	7.8 ± 0.0 a	8.0 ± 0.0 a	7.6 ± 0.0 a
60 : 40	7.5 ± 0.1 b	7.8 ± 0.0 b	7.4 ± 0.0 b
70 : 30	7.9 ± 0.4 c	8.0 ± 0.2 c	8.1 ± 0.6 c
80 : 20	6.5 ± 0.3 d	5.8 ± 0.1 d	5.6 ± 0.3 d
90 : 10	5.8 ± 0.2 d	5.5 ± 0.4 d	5.4 ± 0.5 d
100 : 0 (Control)	5.1 ± 0.6 d	5.2 ± 0.5 d	5.6 ± 0.3 d

± Mean standard error with the same letters are not significant at 5% probability level.

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The result of the t-test showed that there was a significant difference ($p > 0.05$) between juice from steamed and unsteamed seabuckthorn juice. Mean score values of 7.2 ± 0.2 and 8.2 ± 0.3 for the juice from steamed seabuckthorn blended with orange, apple and papaya juice at the ratio of 50:50, 60:40 and 70:30 were preferred by the panelists because fresh juice of seabuckthorn was very acidic and having some astringency. Jagtian (1980), Joslyn and Judith (1964) have reported that steaming could be used as a means of controlling astringency and acidity in fruit juices.

Result of analysis of variance of the sensory scores showed no significant ($p > 0.05$) difference between the colour of the blended and unblended juices. However, the result revealed that the flavour, after taste and overall acceptability of blended and unblended juices were significantly different ($p > 0.05$) from each other. Result of the Tukey's test showed that, the after taste of the seabuckthorn juice blended with orange, apple and papaya juice at the ratio of 50:50, 60:40 and 70:30 were most preferred by the panelists while that of unblended seabuckthorn juice was one of the least preferred (Table 5). It was observed from the study that for the after taste to be reduced significantly, at least 30-50% of the blend should be orange, apple and papaya juice.

This suggests that judicious blending of seabuckthorn juice with orange, apple and papaya juice at the ratio of 50:50, 60:40 and 70:30 respectively and above would significantly reduce the astringency and acidity of the seabuckthorn juice.

Furthermore, Tukey's test revealed that the flavour of juice blended at the ratio of 50:50, 60:40 and 70:30 seabuckthorn juice were least preferred (Table 5).

Tukey's test also revealed that the blends of seabuckthorn such as 50:50, 60:40 and 70:30 with orange, apple and papaya were most acceptable by the panelists while the unblended seabuckthorn juice was least acceptable (Table 5). This suggests that the judicious blending of seabuckthorn juice with orange, apple and papaya juice at the ratio of 50:50, 60:40 and 70:30 and above would give an acceptable drink and these blended ratios were found reasonably rich in ascorbic acid content.

Discussion

Steaming of seabuckthorn berries prior to smooth juice extraction and it is essential to mask the astringency. Therefore, judicious blending of seabuckthorn juice and pulp with at least at the ratio of 50:50, 60:40 and 70:30 with orange, apple and papaya juice and pulp for making RTS beverages, squash and jam will lead to the reduction of astringency and acidic taste of seabuckthorn juice. It will

also lead to the enhancement of the overall acceptability of the drink which is very high in ascorbic acid, carotenes and less in tannins content which imparts health attributes and thus explored the suitability of seabuckthorn berries into various processed products for human consumption.

Acknowledgement

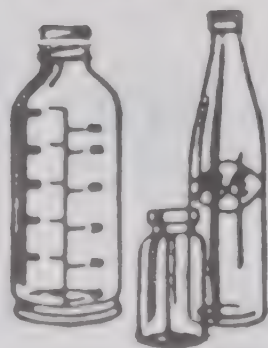
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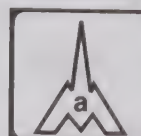
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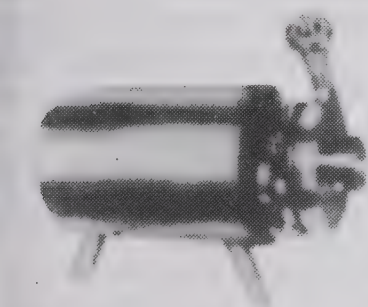
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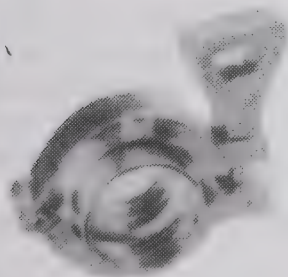
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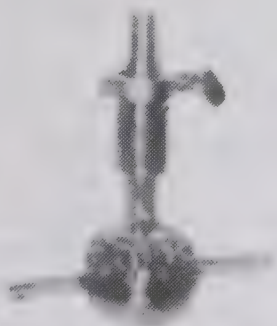
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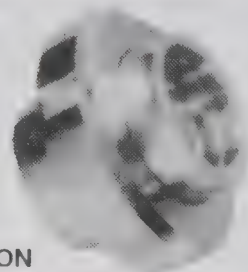
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Low-Fat Samosa: An Experience in Product Development

by
Ujwala B. Jaywant, Uday S. Annapure, Rekha S. Singhal* and Pushpa R. Kulkarni

Abstract

Baked Samosas as an alternative to the fried counterparts could be developed successfully by altering the formulation of the Samosa crust. Addition of 2.0% baking powder, 1.5% carboxymethyl cellulose (CMC), 0.15% Sodium stearoyl lactalate (SSL), 20% substitution of refined wheat flour with corn starch and 20 ml groundnut oil as shortening proved to be the best. The product so obtained on baking at 180°C for 12 minutes, had 52.6% lesser fat as compared to a laboratory fried control product.

Introduction

Samosa enjoys a unique place among the most popular snack foods in India. *Samosa* is a triangular-shaped, stuffed, deep-fat fried product. The outer crust is made up of refined wheat flour (locally called maida) with added shortening. The stuffing is derived from a range of materials varying from region to region and comprises of one or more of the following with addition of seasonings and spices: boiled potatoes, onion, peas and other vegetables or materials derived from meat. It is then consumed hot after deep-fat frying in oil.

Taste, palatability and texture profile of *Samosas* depend upon the formulation of the crust, residence time in the frying medium and temperature of the frying medium. In case of *Samosa* preparation, during frying, the residence time of the product in the hot frying oil results in high oil pickup. The presence of shortening (Plyer, 1952) in the crust prepared from maida further adds to this problem. The high oil pickup is undesirable to the manufacturers (due to high cost) and the consumers (due to health associated reasons). To overcome this problem, an alternative method of processing *Samosa* such as baking can be used. Such products are already sold in pockets of Mumbai city by women entrepreneurs.

Baking as a food processing technology differs from frying in many ways. This therefore calls for alteration in the formulation of the maida casing, since this is the part of the *Samosa* which comes in contact with heat during both frying and baking. The present work attempts to optimise the formulation for *Samosa* and the baking conditions.

Materials and Methods:

Materials

Refined wheat flour (locally called maida), corn starch, potatoes, salt, spices, baking powder and refined groundnut oil for frying and also shortening were procured from the local market in Mumbai city.

Methods:

I) Preparation of control fried *Samosa*

- Preparation of dough for the outer crust: 150 g maida was mixed with 2g salt, 12ml groundnut oil as a shortening and 78 ml water, to form a dough of desired consistency.
- Preparation of stuffing: Stuffing was prepared from 200g boiled potatoes to which 3 g salt and 3 g spices (turmeric and chilly powder) were added and shallow fried in groundnut oil.

- Preparation of *Samosa*: Small balls of about 12 g were made from the dough prepared as above and rolled to form a circular sheet of diameter 6.5 inches. The circular sheet was then cut into two halves. A cone was formed by curling the ends of the semi circle. 16 g stuffing was filled and the open end was then sealed by pressing it to give a triangular shaped *Samosa*.
- Frying of *Samosa*: The *Samosas* prepared were deep-fat fried in 300 ml refined groundnut oil at a temperature of 190°C for 2.5 min.

II) Preparation of baked Samosas: The preparation of baked *samosa* was standardised in trials using various parameters. Different additives (as described in respective tables) were used to modify the crust to comply with baking process that could be used. Using the same stuffer as in (i) the *samosas* were prepared and baked at 180°C for 12 min in a baking oven.

III) Fat content of Samosas: Fat content of the control baked and market samples of *samosa* was determined using the Soxhelt method (AOAC, 1984)

Results and Discussion

The use of baking powder for proper leavening action in a kinds of baked products is widely known (Conn, 1965; Reiman, 1977). Insufficient baking powder gives improper leavening, and excessive use of baking powder gives an unacceptable alkaline soapy taste that is highly undesirable. *Baked Samosas* would not be an exception to this general requirement. Hence the first step was to optimize the level of baking powder in the maida to get good quality baked *Samosas*. Baking powder containing sodium aluminium sulphate with 10% total CO₂ was selected because it gives leavening action in the middle of the baking process. Table 1 shows the effect of the level of baking powder on the quality of baked *Samosa*. It was observed that baking powder at 2% showed an acceptable texture and leavening action, although taste improvement was necessary due to the observation of a dry mouthfeel.

In order to overcome the dry mouthfeel, it was next decided to optimize the level of shortening in the outer crust of *Samosa*. As shown in Table 2 it was observed that the crispness, texture, mouthfeel and appearance improved with increasing shortening levels while the water required for

Table 1. Effect of level of baking powder on organoleptic quality of baked *Samosa**.

% Baking Powder (g)	Observations
0.0	Baking was not achieved. Texture of the crust was hard. Uneven and improper baking. Poor quality product.
0.5	Uneven and improper baking. Texture of the crust was hard.
1.0	Texture of the crust was still hard.
1.5	Texture of the crust was hard.
2.0	Improved texture, crisp but dry product.
2.5	Soapy taste of crust indicating excessive leavening action and residual alkaline components

* Prepared from 150 g maida + 2 g salt + 78 ml water + 12 ml shortening (groundnut oil at 90°C) and baked at 180°C for 12 min.

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proper consistency of the dough decreased proportionately. Good results were obtained when 50 ml of hot (90°C) shortening per 150 g flour was added.

Table 2. Effect of addition of shortening in flour on the quality of baked Samosa*

Shortening (ml)	Water required for dough making (ml)	Observations
12	82	Very hard, uneven baking.
20	78	Hard texture, uneven baking.
25	77	Hard crust, uneven baking.
30	75	Hard texture and uncooked flavour.
35	74	Texture slightly improved but uncooked flavour persistent.
40	72	Texture further improved, hardness decreased.
45	69	Good texture, proper baking and overall improved taste.
50	60	Very good texture on baking, no uncooked flavour, crispness, palatability, mouthfeel and appearance was the best.
55	60	Difficulty in dough forming, Product obtained could not be moulded to required the shape.

* Prepared from 150 g maida + 2 g salt + 12 ml shortening (90°C) + 3 g baking powder with indicated amount of water and baked at 180°C for 12 min.

Substitution of wheat flour with corn starch to lower the gluten content is often practiced in the biscuit industry (Whiteley, 1970) which was extended to *samosa* dough as in this dough elasticity is not required. In the present work, corn starch was substituted from 0-25% (w/w) for wheat flour, and in the crust preparation and *Samosas* were evaluated for organoleptic qualities. Table 3 shows that the composite flour (having a gluten content of 6.8%) containing 20% corn starch gives a superior product. This composite flour was therefore used in further experiments.

Table 3. Effect of substitution of maida with corn starch on quality of baked Samosa*

Corn starch substitution (%)	Water required for dough making (ml)	Observations
0	60	Texture was not good, dry product.
10	60	Texture was improved but crust was dry.
15	61	Texture improved further but crust was dry.
20	62	Best texture, good mouthfeel, product was dry.
25	63	The dough making and rolling was difficult, as cracking of rolled sheets observed.

* Prepared from 150 g composite flour (maida + corn starch at respective levels) + 2 g salt + 3 g baking powder + 50 ml shortening (90°C) with indicated amount of water and baked at 180°C for 12 min.

In order to overcome the dryness in the product when corn starch is substituted for water, hydrocolloid like carboxymethyl cellulose (CMC) was used to increase the water uptake by the composite flour along with the high level of shortening that was previously optimized. From Table 4 it can be seen that 1.5% CMC gave the best product with desirable softness and crust texture.

Additional trials were then carried out to reduce the shortening with the use of emulsifiers such as glycerol monostearate (GMS) (Table 5) and sodium stearoyl lactylate (SSL) (Table 6). It was observed that both GMS and SSL at 0.15% level could reduce the shortening level from 50 ml to

Table 4. Effect of the level of Carboxymethylcellulose (CMC) on the quality of Samosa*

Level of CMC (%)	Water needed for dough making (ml)	Observations
0	60	The product was good but dried immediately after baking within 20 min., therefore crust was hard.
0.5	65	Texture of the product was better than previous batch.
1.0	67	Product improved but still with hard texture.
1.5	69	Very good product with an excellent crust and required softness.
2.0	71	Product was gummy and with improper texture instead of softness.

* Prepared from 150 g composite flour (mixture of 120 g maida + 30 g corn starch) + 2 g salt + 3 g baking powder + 50 ml shortening (90°C) with indicated amount of water and baked at 180°C for 12 min.

Table 5. Effect of glycerol monostearate (GMS) on the quality of baked Samosa*

Level of CMC (%)	Water added (ml)	Shortening added (ml)	Observations
0	69	50	Good product with desired crust texture
0.1	70	45	Very good product
0.1	71	40	Acceptable product without dry mouthfeel
0.1	72	35	Product with perceptible dry mouthfeel
0.1	73	30	*Very good product but not palatable
0.15	73	45	Very good product
0.15	74	40	Excellent product
0.15	75	35	Acceptable product
0.15	76	30	Dry product, not palatable

* Prepared from 150 g composite flour (mixture of 120 g maida + 30 g corn starch) + 2 g salt + 3 g baking powder + with indicated amount of shortening (90°C) and water. Baked at 180°C for 12 min. (emulsifier was added in shortening only).

Table 6. Effect of Sodium stearoyl lactalate (SSL) on the quality of baked Samosa*

Level used (%)	Amount of Water needed for dough making (ml)	Shortening added (ml)	Observations
0.0	69	50	Good product with desired crust texture
0.1	70	40	Good product
0.1	72	35	Good product, palatable.
0.1	73	30	Acceptable but dry product.
0.1	75	25	Dry product
0.15	72	40	Excellent product and can mimic the fried control
0.15	74	35	Very good product
0.15	76	30	Acceptable, palatable product was obtained
0.15	78	25	Dry feeling on biting the crust

* Prepared from 150 g composite flour (mixture of 120 g maida + 30 g corn starch) + 2 g salt + 3 g baking powder + with indicated amount of shortening (90°C) and water. Baked at 180°C for 12 min. (emulsifier was added in shortening only).

40 ml and 30 ml respectively, giving good quality baked *Samosas* which were at par with the fried *Samosas*.

Table 7 shows the fat content of the crusts of various *Samosa* samples. These included fried controls from the laboratory and the market, and the formulated baked *Samosa* with 0.15% SSL and 30 ml shortening per 150 g composite

Contd. on Page 39

Effect of Yeast Strain on the Quality of Pomegranate Wine

by

P.P. Jadhav, P.M. Kotecha and S.S. Kadam*

Abstract

An investigation was undertaken to find out the effect of yeast strain and pH of the must on the quality of wine from juice of Ganesh cultivar of pomegranate. Considering both the chemical composition and the sensory properties of wine, the strain SC CFTRI-101 and pH 3.5 are most suitable conditions for the preparation of good quality pomegranate wine.

Introduction

Pomegranate is a favourite fruit of tropical and sub-tropical regions of the world. It enjoys reputation as a delicious fruit with medicinal properties. During seasonal glut, the fruit prices are fairly low. Pomegranate can be processed into products like juice, squash, syrup, jelly, wine, anardana and canned beverages (Adsule and Patil, 1995). The information on processing of pomegranate fruits for juice and wine is scanty. An attempt was, therefore, made to study the effect of yeast strain on the quality of pomegranate wine.

Material and Methods

Pomegranate fruits of Ganesh cultivar were obtained from the Department of Horticulture, M.P.K.V., Rahuri. All diseased and cracked fruits were sorted out and discarded and the juice was extracted by squeezing the arils gently by pressing through two layers of clean muslin cloth. A pure culture of *Saccharomyces cerevisiae* var. *ellipsoideus* of SC-3090, SC-3095, SC-3287, SC-3300 strains were obtained from National Chemical Laboratory, Pune and SC CFTRI-101 was obtained from Division of Microbiology, Central Food Technological Research Institute, Mysore. It was kept at 0° to 5°C until used for inoculation or subculturing.

The clear juice obtained was adjusted to 23°Brix using sucrose separately. It was supplemented with diammonium hydrogen phosphate (0.05g/100 ml). The juice was adjusted to pH 3.0, 3.5 and 4.0 and then pasteurized at 82 to 85°C for 30 min. After cooling, the must was inoculated with a 48 hour old culture of *Saccharomyces cerevisiae* var. *ellipsoideus* of SC-3090, SC-3095 and 3287, SC 3300 and SC CFTRI-101 strains at 2% level separately. The inoculated must was incubated at 26 ± 2°C upto 15 days. The fermented juice was then pasteurized at 82 to 85°C for 30 min, clarified by using 0.1% bentonite. The various steps in the preparation of pomegranate wines are outlined in Fig. 1.

The Pomegranate wines obtained from different treatments were analysed for chemical composition according to the standard methods of AOAC (1990). The alcohol contents in the wine was determined by the method of Natsu *et al.*, (1986). The sensory evaluation of wines were carried out according to the method of Amerine *et al.*, (1980) on 20 point score card.

Results and Discussion

1) Effect of *Saccharomyces cerevisiae* strain and pH of the must on the alcohol (% v/v) content of pomegranate wine

The alcohol content in wine varied according to the different strain. The alcohol content of wine increased with

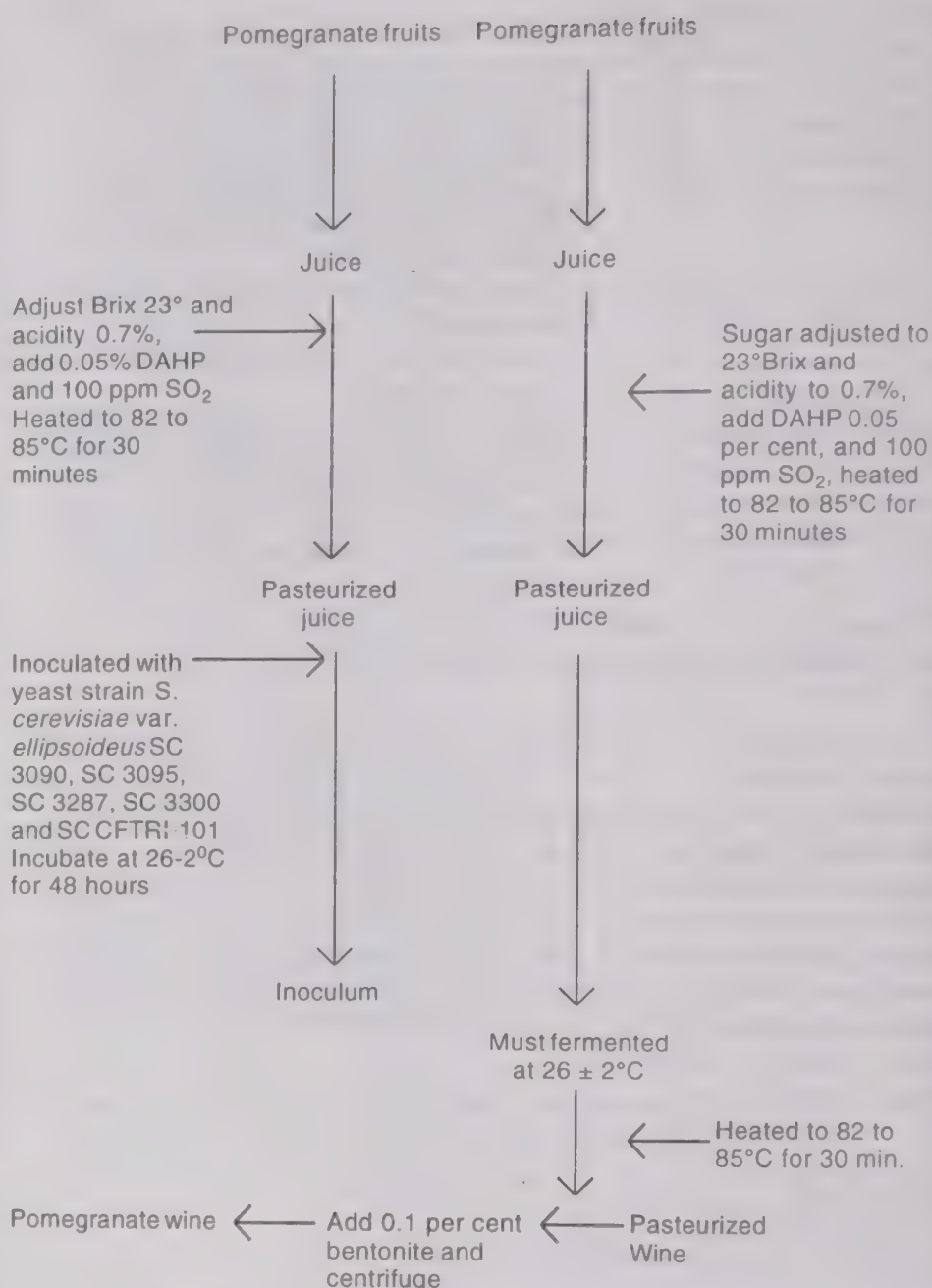


Fig. 1 Flow Chart for preparation of wine from pomegranate juice

Table 1. Effect of *Saccharomyces cerevisiae* strain and pH of the must on the alcohol (% v/v) content of pomegranate wine

pH	Strain					Mean
	SC 3090	SC 3095	SC 3287	SC 3300	SC CFTRI-101	
3.0	3.6	7.4	7.9	7.3	8.0	6.8
3.5	3.8	8.0	8.2	7.7	8.2	7.2
4.0	3.8	8.1	8.3	7.8	8.4	7.3
Mean	3.7	7.8	8.2	7.6	8.2	7.3
SE						
Strain	0.095				C.D. at 5%	
pH	0.073				0.212	
Interaction	0.164				N.S.	

increase in the pH from 3.0 to 4.0. The maximum alcohol content in the wine was observed for strain SC CFTRI-101 at pH 4.0, while minimum from strain SC-3090 at pH 3.0 (Table 1). Effects of different strain and pH on alcohol content of wine were found to be significant. The interaction between the different strain and pH were non-significant. The above

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results are in agreement with literature reports (Joshi *et al.*, 1990).

2) Effect of *Saccharomyces cerevisiae* strain and pH of the must on the overall acceptability of pomegranate wine (score out of 20)

The score for overall acceptability of wine slightly increased with increase in the pH upto 3.5 and thereafter, it decreased. The maximum overall acceptability was observed under conditions of strains SC CFTRI-101 and pH 3.5, while minimum from strain SC 3090 and pH 4.0 (Table 2). The changes in the acceptability score due to different strain and Table 2. Effect of *Saccharomyces cerevisiae* strain and pH of the must on the overall acceptability of pomegranate wine (score out of 20)

pH	Strain					Mean
	SC 3090	SC 3095	SC 3287	SC 3300	SC CFTRI-101	
3.0	14.8	15.8	16.3	15.0	16.2	15.6
3.5	14.9	15.9	16.4	15.4	16.4	15.8
4.0	14.8	15.7	16.0	15.2	16.1	15.5
Mean	14.9	15.8	16.2	15.2	16.3	15.7

	SE	C.D. at 5%
Strain	0.078	0.224
pH	0.060	0.174
Interaction	0.135	N.S.

pH were significant. The results obtained are comparable with reports in literature (Mir *et al.*, 1988, Kotecha *et al.*, 1994, and Krishnaveni *et al.*, 2000). Thus, the results obtained in the present investigation indicate that strain SC CFTRI-101 and pH 3.5 are the optimum conditions for the preparation of good quality pomegranate wine.

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Low-Fat Samosa:

An Experience in Product Development

flour (containing 20% corn starch). The results show that baked Samosa with 0.15% SSL and 30 ml shortening has 19.9 % fat content which is 52.61% less compared to the laboratory fried control Samosa.

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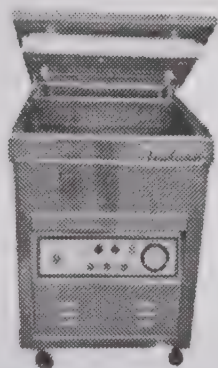
Table 7. Oil content of crusts of Samosa

Type of Samosa	Oil content	% Reduction in oil content
Market Samosa	40.30	0.0
Laboratory fried Samosa	42.00	0.0
Baked Samosa	34.00	19.04
Baked Samosa with 0.15% SSL + shortening 30%	19.90	52.61

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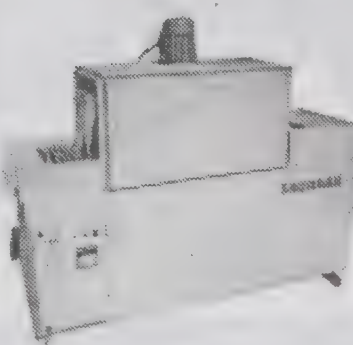
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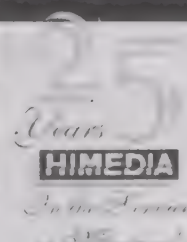
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No Chance for Metal in Food

by
S.P. Pathak, Makarand Mankde & H.D. Prayag

Introduction

India is world's 2nd largest producer of food with high potential to become No. 1. Food market in India is booming with double-digit growth rate (+ 20% per annum). India produces 601 million tons of food every year. At present food market is at Rs. 2,50,000/- crores and is presumed to grow more rapidly to Rs. 5,00,000/- crore.

Food is vital to India's prosperity. A very large proportion of our population (750 Million) is dependent on Agronomy.

India is gifted with rich natural resources. India is also an exporter of both processed food and food processing machinery. To improve the quality and purity of its products, superior technology, equipments and machinery are needed. In the food industry, consumer protection, hygiene and brand name safeguarding have highest priority.

The all (ferrous and non-ferrous) metal detectors and separators therefore are important components for quality assurance in keeping with HACCP. They reliably protect our food products against any magnetic and nonmagnetic metal impurities.

Application and use of all metal detector and separator

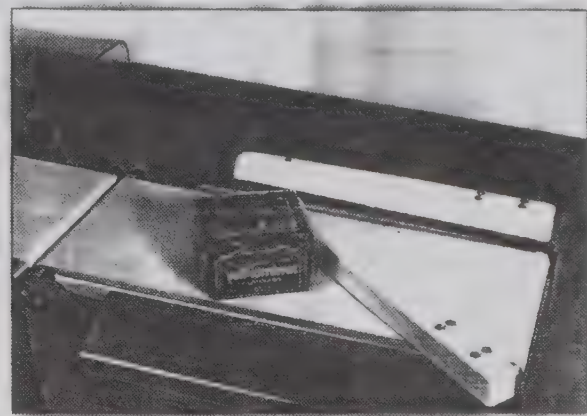
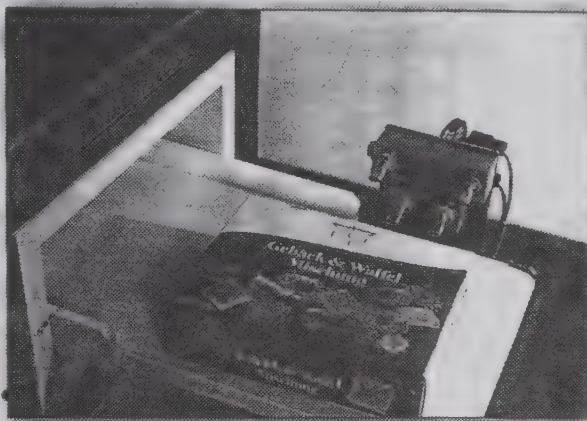
Food and other similar industries cannot under any circumstances afford to have unwanted ingredient in their product. Even the smallest metal particle can have devastating impact on the consumer and the producer. Because of stricter legislation concerning product liability and above all to avoid loss of image, the aim must be *metal free products!*

In addition metal impurities may bring complete production line, which are designed for highest capacity utilization, to a standstill. The consequences are high – repair cost, shortfall in production and failures in observing delivery schedules. Today the all metal detectors and separators are specially designed for Bread, Confectionary, Spices, Flour, Tea, Milk, Fruit pulps and juices, Animal food industries, Sea food etc.

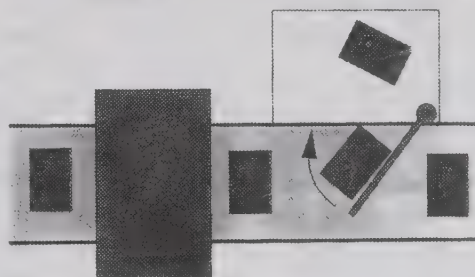
These detectors, which are specifically designed for the food industry, feature state-of-the-art multi-processor technology, digital signal processing, and they offer maximum detection sensitivity, operational reliability, and ISO 9000/HACCP conformity. The all metal

detectors clearly exceed the highly stringent standards that renowned trade chains and food manufacturers demand for the safe detection of foreign particles.

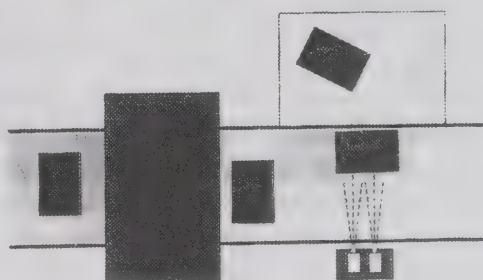
Electronic processes guarantee the high detection reliability of GENIUS metal detectors. Environmental influences at the place of installation are as reliably compensated as thermal changes and mechanical or age-related changes of certain components. The high-precision product compensation function not only prevents spurious detection that may be caused by intrinsic product effects



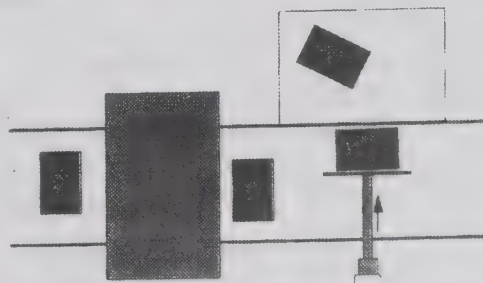
Pic. 12: Double deflection arm



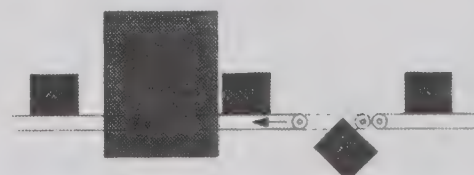
Pic. 13: Ejection by means of deflection arm



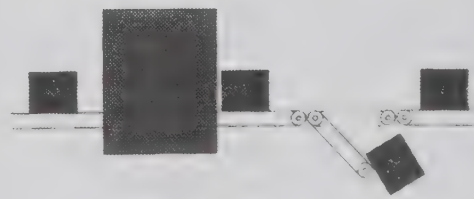
Pic. 14: Ejection by means of blow nozzle



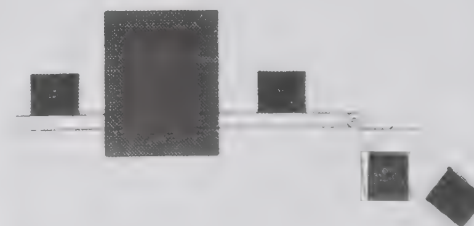
Pic. 15: Ejection by means of pusher



Pic. 16: Ejection by means of retraction belt

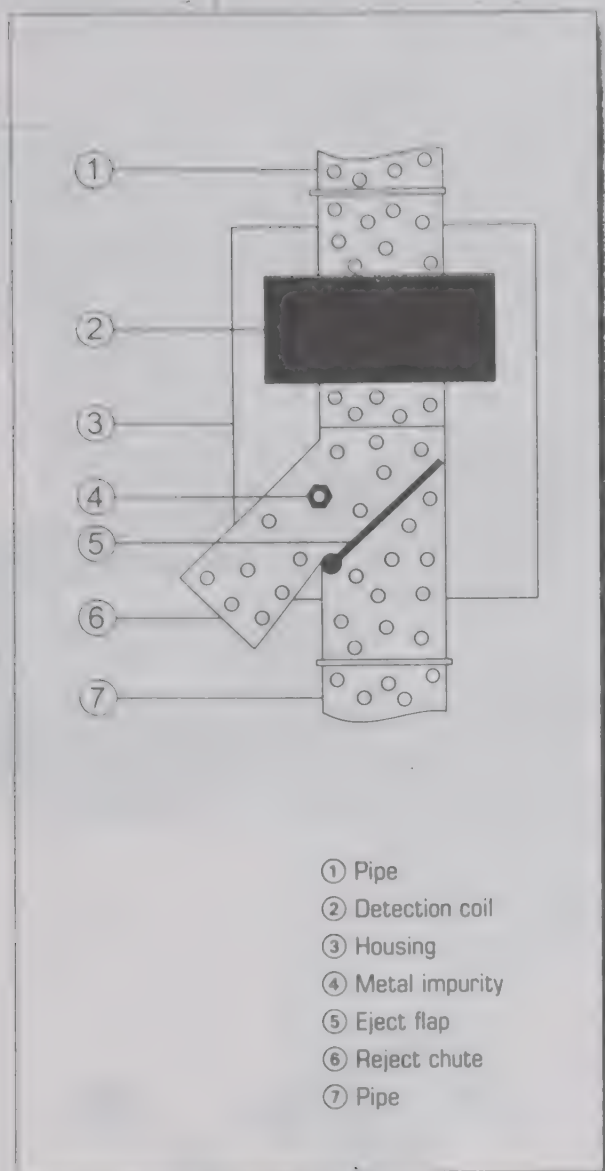


Pic. 17: Ejection by means of drop flap



Pic. 18: Ejection by means of swivel turner

– it is also corrected with highest accuracy in case of slow changes of the material being examined, for example in case of an increasing moisture content, or a slightly thawing product. This guarantees constant detection sensitivity at all times.



- ① Pipe
- ② Detection coil
- ③ Housing
- ④ Metal impurity
- ⑤ Eject flap
- ⑥ Reject chute
- ⑦ Pipe

Pic. 22: Functional principle All Metal Separator RAPID COMPACT and RAPID 5000

"teach-in" process is performed with a reference product. The micro-processor controller detects possible product effects, and exactly adjusts detection parameters and operational reliability to the material being examined. Up to 100 of these settings can be stored in a multi-product memory, from where they can be easily retrieved when needed, which greatly improves ease of operation in case of frequent product or batch changes. The metal detectors are operated by way of a menu-guided dialog, which is shown on an eight-line graphics display. Seven languages are available for this dialog, text input is effected by means of four buttons. Four switching inputs and outputs each, as well as RS 232 and RS 485 interfaces, allow easy process integration and connection to higher-level control systems.

In addition to direct process control all the measurement results are stored for inspection and verification purposes. All the settings, operating conditions and operating results are completely stored in the system logbook of the GENIUS detectors. With an integrated report generator this information can be statistically processed, printed, or transferred to a control PC.

The metal detectors of the GENIUS series are available in two versions: as GENIUS GLS tunnel detectors for application in conveyor belt systems, and as GENIUS RZ tunnel detectors for monitoring suction and pressure

The detection frequencies of the GENIUS detectors can be selected by pressing a button, which allows optimum matching to the product. Furthermore this frequency selection feature essentially contributes to the high noise immunity / operational reliability, because a noise-free frequency band can be selected in case of interference, for example from neighbouring metal detectors. Upon detection of a contaminated product, the metal detectors are able to control connected separating systems, and to monitor ejection.

GENIUS detectors are optimised for ease of operation. This already starts with product-dependent system setting, which means that a

conveyor pipes, free-fall sections, pipe installations, filling systems.

Advantages of Metal Detector and Metal Separator

- Positive detection and separation of all ferrous and non-ferrous impurities
- No swirling and wedging of the product during separation
- Product is treated with utmost care during separation
- No jamming and no deposits (nests)
- Due to quick release lock, speedy removal of separating unit for cleaning processes
- Highest and permanent sensitivity
- Easy to install and use as well as maintenance free. compact equipment can be mounted anywhere in process, before packing or after packing to examine packed product
- Designed according to FDA requirements
- Product and production oriented solutions
- Easy integration in pipe systems
- Custom built and complete solution to your product

Conclusion:

It is essential to produce goods of world standard. All metal detectors and separators are used, both for intermediate testing after certain production stages and for the inspection of finished goods. Hence, all metal detectors and separators offer the product and production oriented solution unit for food and allied industries. In addition to ensuring the purity of the product, it also protects the processing downstream equipment such as Grinders, Shredders, and Crushers from damage due to metallic impurities.

Acknowledgement:

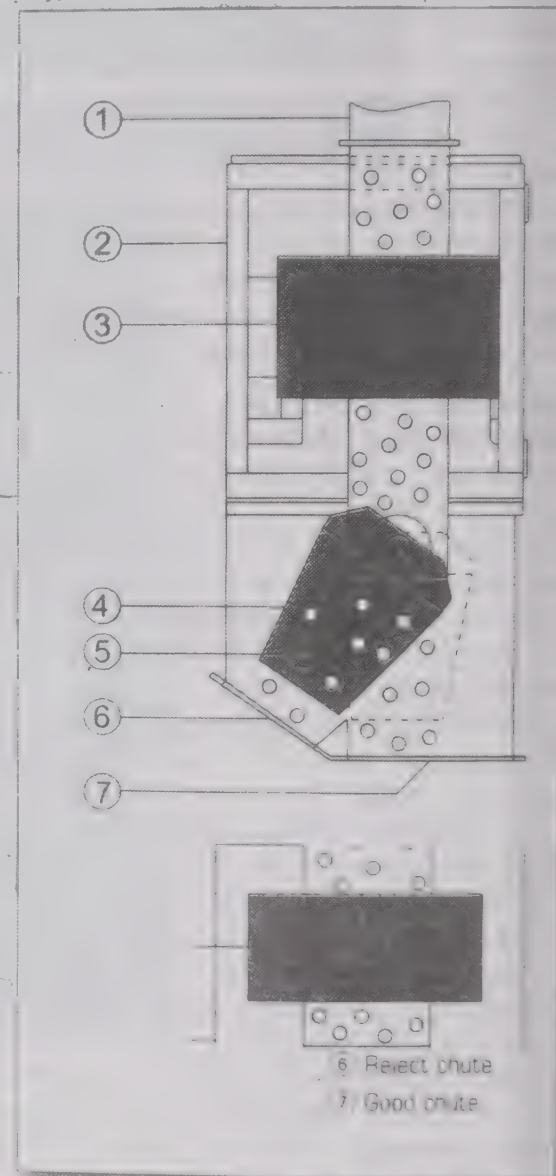
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Internal Technical data of

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Pic. 23: Functional principle All Metal Separator RAPID

Effect of Packaging Materials on Strawberry Sauces

by
R. Saravana Kumar and G. Manimegalai

Abstract
Sujatha and Labella strawberry varieties were used for preparation of sauce as per FPO specification. The prepared sauces were packed in glass bottles and polypropylene pouches and sealed air tightly. The prepared sauces had reddish pink colour, strong flavour and highly acceptable taste. The changes in the chemical constituents, microbial load and organoleptic characteristics of the sauces were noted by storage at room temperature for 90 days.

Introduction
Jams, jellies, sauces and pickles of various kinds are prepared by using fruits and vegetables for the household use as well as for commercial scale. They find a ready market not only but also in many other countries. Standard recipes have been suitably modified to the acceptance of people in the country and other parts of the world. The sauces should contain 3 per cent sugar according to the recipe of sauce made from fruits and vegetables. An attempt has been made to prepare strawberry sauces and to check their storability and consumer acceptability.

Materials and Methods

Strawberry varieties namely Sujatha (V_1) and Labella (V_2) were purchased from the Maxworth country (India) Limited, Kodaikanal and used for this study. Mature, sound ripe fruits were selected, washed in clean water and surface dried. The calyx of the fruit was removed and the pulp was passed through hand pulper and the sauce was prepared as per FPO specification (Siddappa, 1986). The prepared sauce was packed in glass bottles (C_1) and polypropylene pouch (C_2) and sealed air tightly. The steps involved in the preparation of strawberry sauce is given in Figure 1. The storage behaviour of the sauce was observed by storing at room temperature.

TSS (using hand refractometer), pH (Hart and Fischer 1971), total acidity (Ranganna, 1977), ascorbic acid (Mahadevan and Sridhar, 1982), reducing and total sugars (Ranganna, 1977), Anthocyanin (Mancinelli *et al.*, 1975) and microbial load (Istavankiss, 1984) of the strawberry sauce samples were determined periodically over the period of 3 months. The sauce samples were organoleptically evaluated by 10 semi trained judges using hedonic scale ranging from 1 to 4 for lowest to the highest.

Results and Discussion

The prepared strawberry sauces were reddish pink in colour with strong natural flavour. The taste of the sauce were highly acceptable like any other sauces prepared from fruits.

i) Chemical changes of the strawberry sauces

The chemical constituents, microbial load and the organoleptic scores of the packed sauces were analysed once in 15 days. For the discussion the initial and the final values were taken. The changes noted in the chemical constituents are given in Table 1.

A gradual increase in the acidity and a low reduction in pH of the strawberry sauces packed in glass bottles and polypropylene pouches were observed during storage. The initial acidity of the strawberry sauces 1.00 and 1.02 g per cent had increased to 1.21 in V_1C_1 , 1.18 in V_1C_2 , 1.19 in V_2C_1 and 1.17 in V_2C_2 . Similarly the initial pH 5.40 was decreased to 5.11 in V_1C_1 , 5.16 in V_1C_2 , 5.12 in V_2C_1 and 5.12 in V_2C_2 after 90 days of storage. The titratable acidity of the apple pomace sauce resulted a change in acidity from 1.2 to 1.27 per cent after storing for 6 months at room temperature (Joshi *et al.*, 1996). The kinnow products packed in flexible and rigid bottle and metallic containers showed a negligible change in pH during 24 weeks of storage at 12-39°C (Ranote *et al.*, 1993).

Strawberry sauces exhibited only very slight increase in TSS (37-37.40 Bx) throughout the storage periods in both the varieties packed in different packaging materials (C_1 and C_2). Similar trend was found in the apple pomace sauce (20 to 21.42° Bx) stored for 6 months at room temperature by Joshi *et al.*, (1996).

The reducing sugar content of sauces (V_1 and V_2) packed in C_1 and C_2 showed a gradual increase throughout the storage periods. The initial reducing sugar content of strawberry sauces were noted as 4.24 in V_1 and 4.25 g per cent in V_2 which had changed to 4.32 and 4.33 g per cent. A significant difference in the reducing sugar content between varieties packaging materials and storage periods were noted in the present study. The stored apple pomace

Figure 1. Preparation of Strawberry Sauce

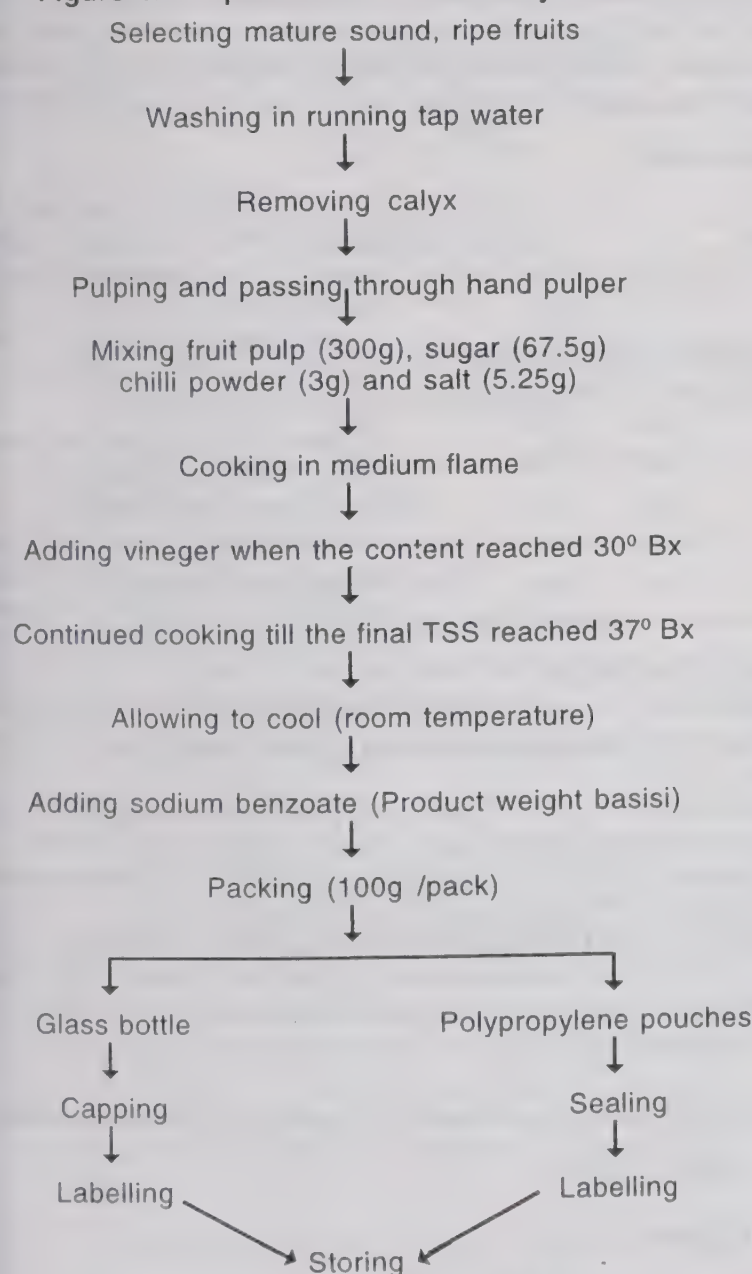


Table 1. Changes in the Chemical Constituents of Strawberry Sauces During Storage

Period of storage	TSS		Acidity		pH		Reducing sugar (g%)		Total sugar (g/%)		Vitamin C (mg %)		Ant (A)
	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial	Final	Initial
V ₁ C ₁	37.2	37.5	1.00	1.21	5.40	5.11	4.24	4.32	27.00	25.10	18.00	15.90	0.635
V ₁ C ₂	37.2	37.5	1.00	1.18	5.40	5.16	4.24	4.33	27.00	25.02	18.00	15.00	0.635
V ₂ C ₁	37.0	37.4	1.02	1.19	5.40	5.12	4.25	4.33	26.44	26.64	21.60	19.20	0.585
V ₂ C ₂	37.0	37.4	1.02	1.17	5.40	5.12	4.25	4.33	26.44	24.64	21.60	18.36	0.585

sauce exhibited an increase in the reducing sugar content from 11.69 to 14.63 per cent when stored for 6 months at room temperature (Joshi *et al.*, 1996).

The total sugar content of sauces were found to be decreased in all the packaging materials in both the varieties (V₁ and V₂). The initial total sugar content of the strawberry sauces were (27.00 and 26.44 g per cent) changed to 25.10, 25.02, 24.64 and 24.64 in V₁C₁, V₁C₂, V₂C₁ and V₂C₂ respectively after storing for 90 days. Ranote *et al.*, (1993) also reported that a decline in total sugar content of kinnow products packed in flexible pouch, can and bottle stored at room temperature.

Among the two strawberry sauces, the sauce prepared from Labella contained higher ascorbic acid content throughout the storage periods than Sujatha. The sauces packed in glass bottles (C₁) exhibited a higher retention of ascorbic acid content than the samples packed in polypropylene pouch (C₂). The percentage loss of ascorbic acid content of the sauces packed in C₁ and C₂ had ranged between 11.6 and 11.7 and 15.0 and 16.0 respectively in Sujatha and Labella. Ramasastri (1974) experienced the similar effect in the stored amla pickle.

Table 2. Organoleptic score values of Strawberry Sauces during storage

Quality attributes	Sauce samples							
	V ₁ C ₁		V ₁ C ₂		V ₂ C ₁		V ₂ C ₂	
	0 Day	90 th Day	0 Day	90 th Day	0 Day	90 th Day	0 Day	90 th Day
Appearance	4.0	3.6	4.0	3.3	4.0	3.5	4.0	3.3
Colour	4.0	3.5	4.0	3.3	4.0	3.3	4.0	3.0
Flavour	4.0	3.6	4.0	3.3	4.0	3.6	4.0	3.3
Taste	4.0	3.8	4.0	3.5	4.0	3.6	4.0	3.3
Overall acceptability	4.0	3.8	4.0	3.4	4.0	3.6	4.0	3.3

The sauces prepared from Sujatha contained more anthocyanin content when compared to Labella throughout the storage periods in both the packaging materials. The anthocyanin content of the sauces were found to be changed to 0.635 to 0.585 (in V₁) and 0.585 to 0.535 (in V₂). The percentage loss of anthocyanin content of the sauces ranged between 7.8 (in V₁) and 8.4 (in V₂). A significant difference in the retention of anthocyanin content was noted between varieties and storage periods.

ii) Microbial load of the strawberry sauces

The microbial load of the sauce samples were analysed before and after storage. The sauces prepared from both

the varieties record zero microbial count initially. After 90 days of storage the samples V₁C₁, V₁C₂, V₂C₁ and V₂C₂ contained 3.0 and 4.0 x 10⁶ /g bacterial flora, 2.0 and 3.0 x 10⁴ /g fungal and 1.0 and 2.0 x 10⁵ /g yeast for the sauces packed in bottles and polypropylene pouches respectively.

iii) Organoleptic Evaluation of the strawberry sauces

The strawberry sauces packed in different packaging materials were evaluated at regular intervals for the various quality attributes such as appearance, colour, flavour, taste and overall acceptability. The changes in the organoleptic score values of strawberry sauces during storage are given in Table 2. The products stored in bottles had recorded higher scores (90%) than the sauces stored in the polypropylene pouches (82%). Only a slight difference in the score values was observed between varieties. The sauces prepared from Sujatha and Labella strawberry packed in bottles and polypropylene pouches had maintained their consumer acceptability with very little change in their chemical constituents during the study period.

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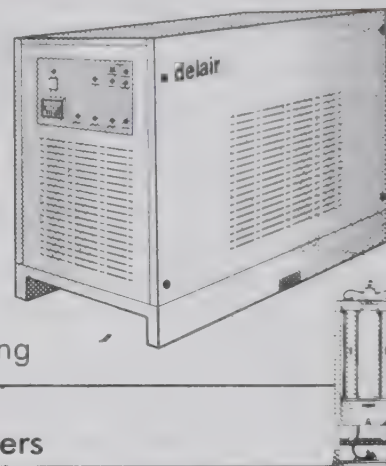
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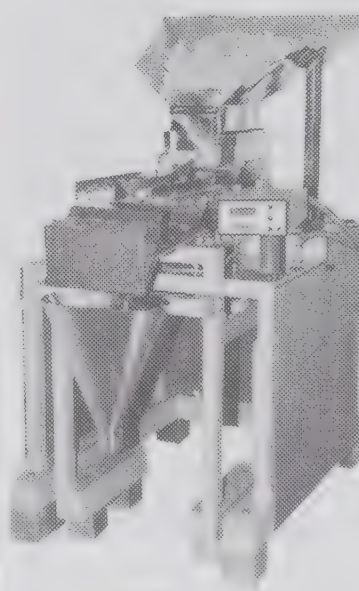
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The First PET – Aseptic Bottling Line up and Running

by
Anton Schindlbeck*

In November 2000, the mineral water bottlers Adelholzener Alpenquellen started operation with the first and currently most sophisticated line from Krones for cold-aseptic filling of still water, fruit juice and mixed beverages in non-returnable PET bottles. This prototype line, newly developed in close cooperation between Adelholzen and Krones, supports the company's philosophy of being satisfied with nothing less than optimum quality, and using no preservatives whatsoever in its bottling operation. This was the only way to implement the planned launch of non-returnable PET bottles in the still water and soft-drink segment of the market. The line operates with the innovative PET-aseptic filling process, a three-stage concept from Krones featuring an injector-rinser-filler combination and cutting-edge cleanroom technology.

Booming Sales

In the midst of the picturesque Chiemgau, against the shimmering backdrop of the Alps, with the nunnery and the monastery's gardens in the foreground, lies the harmoniously integrated bottling plant of Adelholzener Alpenquellen. The Congregation of the Sisters of Mercy of Saint Vincent of Paul, headquartered in Munich, has been operating the spring (first documented in the 3rd century) since 1907. At first, it was the nuns themselves who bottled the water laboriously by hand. It was after the Second World War that Adelholzener, Alpenquellen's sales really began to take off, receiving an extra boost from the sodium debate of the 80s

Today Adelholzener Alpenquellen is an ultra-modern facility with a payroll of 300 and five bottling lines in all, four of them for returnable glass, and since 1998 one Krones line for returnable PET bottles, producing a total hourly output of 184,000 bottles. With significantly more than 300 million fills, Adeholzen ranks about 11th among Germany's biggest mineral water bottles.

The booming sales achieved over recent years are attributable firstly to a continual series of new products, and secondly, as Managing Director Friedrich Schneider emphasises, to the PET range: "We're running three shifts a day, six day, a week, the bottleneck at present is the returnable PET bottles". After only two years, the PET segment is already accounting for more than 10 per cent of total output, a proportion that's still rising "Although we are not interested in displacing glass, because it's the classical packaging material, and for business reasons we want to keep on using our existing glass bottling lines".

Pioneers of the PET cause

But after successfully entering the PET water market in 1998, more or less overnight with their 16,000-bph Krones returnables line, as the only mineral water producer to offer the 0.5 l PET returnable bottle as well, the decision was swiftly taken to go for the non-returnable option. "We realised that we can reach certain segments of the market only with non-returnables". Two-thirds of Adelholzener's sales come from mineral water, a tenth from medicinal water and a quarter from soft drinks. Sales of this latter are soaring. "We are creative and innovative - something our

technical people aren't always too pleased about. We produce and bottle more than 50 different articles." From Adelholzener Mineral Water classic or the elderberry beverage "Holler fit & Frisch" to the fruit-yoghurt drink Orange-Banana-Vanilla in 0.25 L, 0.7 L, 0.75 L and 1L glass bottles, plus 0.5 L, 1.5 L PET.

On its new cold-aseptic line, Adelholzen produces the PET bottles itself, using a 16-station Krones Contiform blow-moulding machine. The entirely innovative cold-aseptic filling equipment as such comprises an injector-rinser-closer BLOC, with a roof-table all along the front, and is housed in a cleanroom system integrated into the protective guarding. Two years of practical experience with aseptic returnables bottling Adelholzen enabled a series of innovative developments and detailed improvements to be introduced.

Stage1: The Injection Machine

The newly developed injection machine basically resembles an electro-pneumatically controlled rinser, which features a twin-channel system using disinfectant in combination with steam to sterilise the bottles.

The bottles come directly from the blow-moulding machine, and are fed via air conveyors with a neck-handling system to the injection machine. The air transport from the blow-moulding machine into the cleanroom is completely enclosed. The neck-handling transport is already effected under cleanroom conditions, with the bottles being blown along by a flow of sterile air. The injector features two separate channels for disinfectant and steam. The requisite quantity of disinfectant is dosed in precisely using a flow meter, and atomised in the bottle together with the automatically supplied steam by means of an injector nozzle.

The steam injected serves firstly as a carrier medium, thus ensuring an absolutely even distribution of the disinfectant on the wall of the bottle, and secondly for heating up the actual disinfectant.

The bottles are also passed through a spray tunnel, in which the outside of the bottle is sterilised. The disinfect-



In the injector, the vertically positioned bottles are treated with ultra-finely atomised disinfectant.

*Domestic Sales Manager, Krones AG, Neutraubling, Germany

ant running down the outer wall is passed to a reservoir with the aid of a collecting trough. This reservoir is fitted with a level control and a return pump, and passes the collected disinfectant to the downstream rinser, in which it is used for prerinsing the bottles.

The switching valves required are in Teflon-bellows design. The injector's valve node is fitted with automatic flap valves. All metal parts are made of rustproof stainless steel, with high-quality V4A used for all those metal parts coming into contact with the disinfectant.

Stage 2: Triple-Channel Rinser

In the electro-pneumatically controlled rinser which follows the injector, the bottles are cleaned by means of a triple-channel system, using disinfectant, sterile water and sterile air, to remove residual germs and residual disinfectant.

Guided by the neck-handling system, the bottles are passed directly from the injector into the rinser. Once the bottle has been accepted, it is swivelled by 180° so that it is vertically positioned inside the rinser, with the mouth pointing downwards. First of all, it is flushed out with disinfectant, using the residual disinfectant found in the injector. At multiple intervals, the bottle is then flushed out with sterile water in the jetting system, i.e. sterile water and sterile air in a defined mixing ratio are sprayed into the bottle together. This ensures that the sterile water is optimally distributed inside the bottle, thus wetting every part of it while at the same time saving on sterile water. Between the intervals, pauses are provided to enable the bottle to drain empty. After the cleaning procedure, there is an option (if necessary) for blowing out the bottle with pure sterile air, in order to minimise the residual water content involved.

The bottles are also passed through a spray tunnel, in which the outer walls are flushed. Disinfectant and sterile water are passed via separate collecting troughs into reservoirs, and pumped back into the circuit.

The rinser's valve node is fitted with automatic aseptic valves. The housing is made of V4A, and the seal seat of PTFE bellows. The O-rings consist of EPDM or HNBR. The rinser, together with the valve node, has been fully integrated into automatic CIP system.

Stage 3: Volumetric filler

The Volumetric VO-DM-PET filler is an electro-pneumatically controlled volumetric gravity filling system. The product bowl is supplied through the liquid manifold via an aseptic control valve. Inside the product bowl, a cushion of inert gas is provided above the actual product. A fine pressure control feature required for this purpose has been integrated into the system. Probes regulate the level inside the product bowl, and ensure uniform flow velocity.

A neck-handling system is again used to pass the bottles to the filling valves, where they are filled without touching the actual mouth of the filling valve, thus precluding the possibility of any contamination from the seal materials.

Before being filled, the empty bottles are flushed with inert gas. After the valve cone has opened, the product flows in over the inside wall of the bottle. The residual air is displaced into the atmosphere through the mouth of the bottle, thus preventing air from flowing back into the product bowl and any contamination of the medium.

Inductive flow meter

A faultless filling process is possible only if the liquid is fed to the flow meter without bubbles. For this reason, the flow meter is mounted vertically under the product bowl, so as to enable bubbles to rise even when it is being filled for the

first time. Bubbles carried along during production (by the product pump, for example) can rise in the product bowl beforehand, and thus cause no functional impairment.

The fill volume is determined by an inductive flow meter; it can be altered directly even while the filling process is ongoing. The fill heights and head space clearances achieved will depend on the standard deviation of the bottles concerned, which in Adelholzen's case is very slight.

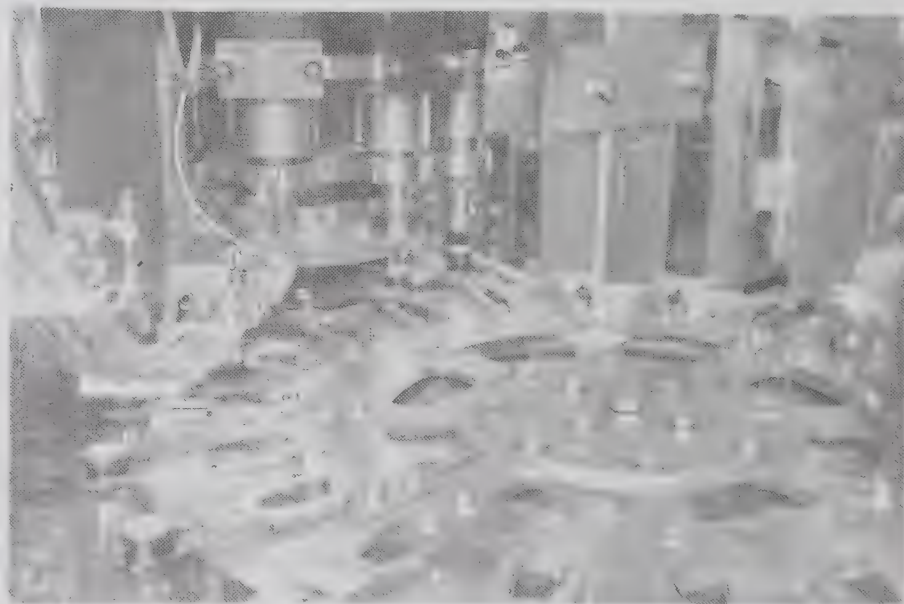
The filling valves' working cycles can be individually programmed and controlled. Moreover, the preset values can be stored in memory, and reproduced at will in a matter of moments.

The central computer required for the control functions is integrated in the electronics tower in the rotating part of the filler, and can thus communicate with the valve units without transmitting any control pulses via the slipping transmitter. This precludes the possibility of transmission errors.

The switching valves located at the filling valves and required for the filling process are Teflon-bellows valves. Thanks to the short strokes, small installation spaces and their flow-optimised shapes, they are particularly well suited for aseptic systems in terms of microbiological safety and cleaning-friendliness.

Open sealer

The sealer is likewise a new design from Krones, excelling in terms of open construction and optimised accessibility. The closures are disinfected at the sorter, in a peracetic acid immersion bath. The peracetic acid is then flushed off with sterile water and sterile air. Downstream of the sealer, the peracetic acid still adhering to the body and base of the bottle is removed by means of a fresh-water bottle shower. Adelholzen is the first bottler to use the "Flip-Top" closures with a built-in diaphragm to avoid spills. Once opened, the beverage flow can be dosed very effectively. In addition, the PET bottles incorporate a "Front-Cap" sealing disk, which prevents oxygen pick-up or recontamination before the close.



The PET bottles incorporate a "Front Cap" sealing disk, which prevents oxygen pick-up or recontamination before the closer.

Newly developed roof-table

The specially developed "Roof-Table" at the front, a sandwich design patented by Krones, with mineral safety glass protection, extends over all three machines - injector, rinser and filler. It is made of stainless steel sheeting, and

is shaped like a hipped roof, so as to avoid pools of liquid collecting. "A huge advantage", as Technical Director Erwin Hachl puts it. All parts attached to the front table, like the starwheel columns, are welded, and thus absolutely gap-free, providing optimum conditions for cleaning and rinsing, and for foam-based cleaning as well. All pneumatic and electrical components are, as far as possible, located outside the front table. The table's feet and lubrication lines are likewise made of stainless steel, and are freely accessible for cleaning, thus avoiding concealed centres of infection.

Cleanroom: room-in-room concept

The cleanroom's job is to maintain the entire sterilisation, filling and closing processes under defined, sterile conditions. The normal atmosphere is kept away by means of overpressure and laminar flow of sterile air



The room-in-room concept provides the operating staff with an unrestricted radius of action while assuring 100% protection against re-infection.

In the injection machine, an absolutely sterile atmosphere is achieved, by virtue of the sterile air feed and bottle treatment with the steam mixture. This part of the cleanroom is designed to comply with Class 1000. The rinser, filler and closer cleanroom is designed to comply with Class 100. To ensure that for interventions in this area the risk of re-infection through air, contact, etc. can be absolutely ruled out, a second "loosely detached" cleanroom of Class 1000 has been installed. This second cleanroom accommodates the injection machines's front table, the rinser's front table, the filler/closer's front table, the filler discharge, and the service doors.

Crucial cleanroom parameters, like pressure differentials from the grey area, temperature and relative humidity in the air-conditioned zone, are measured continuously, and documented by the LDS (Line Documentation System). The cleanroom's guard doors are continually monitored. "This form of process monitoring guarantees us a continuously aseptic state", notes Technical Plant Manager Volker Marquardt.

Easily accessible

The room-in-room concept offers 100% protection against re-infection from the surrounding air and by contact. The free-standing machines in the sterile zone ensure optimum cleanability of the exterior surfaces. "It was important to us that the operator is not tied down, that he or she can look after more than one machine, like the blow-moulding machine or the flash pasteuriser", emphasises Erwin Hächl.

Access to the machines is quick and easy, with no air-lock involved; the operating staff's radius of action is unrestricted. Operator control is effected from outside, with operators integrated into the outer cleanroom. In the event of malfunctions, they can, if wearing appropriate outer clothing, intervene in the Class 100 cleanroom. At directly endangered points, e.g. for inserting CIP cups or changing closer caps, protective gloves, designed for all-round cleaning have been permanently installed, to avoid unprotected manual intervention. At the same time, direct communication with other parts of the production process is not impeded.

The Krones beverage proportioning system has for the first time been fitted entirely with aseptic valves, all the pipes to the filler are in aseptic construction. In the Kettner dry end, the people in Adelholzen have aimed to conceive an "all-round system", one which permits as many packaging variants as possible, such as 3x6 multipack, 18 bottles loose in tray, wrap-around with and without layer pads, high tray, 20-bottle large tray, etc. Maximum flexibility of design is required for the end-of-the-line packaging.

The new line has been dimensioned for 22,000 0.5 l bph or 18,000 1 l/h or 13,000 1.5 l/h. If the Adelholzener non-returnable PET bottle is favourably received by consumers, space has already been set aside for a second, mirror-image line.



FORM IV

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Performance and Pickling Quality of Six Genotypes of *Coleus forskohlii*

by

Shankargouda Patil, Hulamani, N.C. and Rokhade, A.K.

Abstract

Studies were conducted on the performance of six genotypes of *C. forskohlii* collected from diverse sources on growth, yield and their suitability for pickling during the years 1998 and 1999. Among the genotypes evaluated, accession C2 excelled in morphological characters like plant spread (NS) upto 120 days, plant spread (EW) upto 90 days, number of branches per plant at 150 days, number of leaves per plant at 60 days, lamina length, and petiole length at all the crop growth stages compared to other accessions. Among the yield parameters evaluated, accession C2 recorded the highest length of tubes (15.44 cm), diameter of tubers (1.68 cm), number of tubers per plant (41.37), fresh weight of tubers per plant (534.75g), volume of tubers (487.04cc) and harvest index (45.94%). The studies on the acceptability of the pickles prepared from different accessions of *C. forskohlii* revealed that pickles prepared from accession C2 were highly acceptable.

Introduction

Coleus forskohlii Briq. (syn. *C. barbatus* Benth.) is known for its fasciculated tubers which are used for the isolation of diterpene active principle known as forskolin (Coleonol) which is being developed as a drug for the treatment of glaucoma, congestive cardiomyopathy, asthma and certain types of cancers (De Souza *et al.*, 1986; Shah *et al.*, 1980). This crop is known to have originated in the Indian subcontinent and is distributed in subtropical Himalayas, Southern India and in Sri Lanka.

Because of the exclusive presence of forskolin in *C. forskohlii*, it enjoys the current recognition of its status as a singular crop of high medicinal importance internationally. In this indigenous medical plant knowledge encompassed will greatly aid direct exploitation of variability as cultivars and indirectly as a base material for breeding programmes. Vegetative method of propagation adopted in this species for commercial cultivation heightens the prospects of utilising the superior genotypes identified in the present study, without the risk of segregation. In this species occurrence of wide genetic diversity in nature for tuber yield have been reported by earlier workers (Vishwakarma *et al.*, 1988; Hedge, 1992; Nanaiah 1993; Prakash and Krishnan 1994).

Traditionally *C. forskohlii* is grown for its tubers which are pickled and eaten (Anon, 1950). At present, there are no reports on the suitability of varieties or genotypes for preparation of pickles. The locally available cultivars are pickled and sold in the market. The consumers prefer a variety or genotypes with better taste, flavour and texture if the choice is given to them. The present study was taken up with these considerations in view at the Kittur Rani Channamma College of Horticulture, Arabhavi, during May 1998 to November 1999.

Materials and Methods

The present study was conducted at Kittur Rani Channamma

College of Horticulture farm during the years 1998 and 1999. Six genotypes (B1, C1, C2, K8, H1 and BL) of *C. forskohlii* were used in the study, which originated from different parts of the state. The unrooted cuttings from terminal portion of each accession were planted in polythene bags filled with 1:1 mixture of well decomposed farm yard manure (FYM) and red soil. Cuttings were dipped in 500 ppm of Indole Butyric Acid (IBA) before planting in polythene bags filled with rooting medium. The cuttings were watered daily till 45 days in the nursery. After 45 days in the nursery, the rooted cuttings of each genotypes were planted in the main field at a spacing of 60 x 45 cm in plots of 2.4 x 2.7 m. The polythene bags were removed without disturbing the root system and were planted with minimum damage to the root system. The plants were applied with fertilisers at the rate of 60:40:50 kg per ha in the form of urea, super phosphate and muriate of potash. The experiment was laid out in Randomized Complete Block Design (RCBD) with four replications. The experimental plots were irrigated once in three days in the initial stages of establishment and the frequency of irrigation was reduced to once in 7-10 days at the later stages. Plant protection measures were taken up to control the insect pest and diseases. Observations were recorded on morphological characters like plant height (cm), plant spread (cm) in east west and north south directions, number of branches per plant, number of leaves per plant, lamina length (cm), lamina breadth (cm), and petiole length (cm) at 30, 90 and 150 days after planting. Yield characters like fresh weight of tubers (g), tuber length (cm), tuber diameter (cm), tuber numbers, tuber volume (cc), tuber density (g/cc) and harvest index (%).

For evaluation of the pickles, the above mentioned six genotypes were used. The freshly harvested tubers of each accession of *C. forskohlii* were washed and outer layer was peeled and cut into pieces of 1.0 to 1.25 cm size and were pickled as per the procedure suggested for pickling raw mango (Anon, 1996). The ingredients used for pickling the accessions were common for all the accessions.

The pickles so prepared were evaluated for organoleptic characters like taste and flavour, texture and overall acceptability 30 days after pickling. A panel of sixteen judges consisting of members of Kittur Rani Channamma College of Horticulture, Arabhavi, were selected for the evaluation of organoleptic characters on a five point hedonic scale (Ranganna, 1986). The study was conducted by adopting Completely Randomised Design (CRD) with four replications.

Results and Discussion

The results of the experiment are discussed on pooled data of two years of experimentation. Comparison of the genotypes revealed significant differences for all the morphological characters studied (Table 1.). Highest plant height was recorded by genotype C1 at 30 and 150 days, while accession BL recorded the highest plant height (43.19cm) at 90 days. Accession C2 was a dwarf type, recording the least plant height at all the crop growth stages observed. While accession BL recorded the highest plant spread in N-S (56.84cm) and east-west (55.99cm), at 150 days, geno-

Kittur Rani Channamma College of Horticulture, Arabhavi - 591310, Gokak-Tq., Belgaum-Dist., Karnataka

Table -1: Morphological characters recorded at 30, 90 and 150 days in accessions of *C. forskohlii* (Pooled data)

Genotypes	Plant height (cm)			Plant spread (cm) N-S			Plant spread (cm) E-W			Number of branches		
	30 days	90 days	150 days	30 days	90 days	150 days	30 days	90 days	150 days	30 days	90 days	150 days
BL	21.95	43.19	54.49	18.89	49.62	56.84	18.10	45.16	55.99	15.01	57.18	109.37
K8	21.64	35.35	45.77	16.24	42.22	48.16	16.23	39.85	48.75	11.99	46.35	87.94
C1	25.98	42.36	56.96	18.94	47.39	55.41	19.55	44.08	53.50	14.83	52.59	104.07
C2	19.28	26.85	30.52	25.66	51.15	56.11	27.03	46.51	55.44	11.15	58.21	111.05
H1	24.98	41.61	50.94	17.57	45.64	51.61	17.89	43.00	51.75	13.18	50.91	100.44
B1	21.79	39.50	45.87	18.21	40.86	48.79	18.48	39.78	48.54	11.02	48.74	94.66
Mean	22.60	38.14	47.39	19.25	46.15	52.77	19.55	43.06	52.33	12.86	52.33	101.24
F Test	20.57*	27.00*	38.10*	25.38*	12.32*	8.56*	53.53*	11.75*	5.33*	21.83*	2.58	100.45*
S. Em±	0.54	1.19	1.53	0.65	1.16	1.31	0.52	0.81	1.44	0.38	2.90	0.88
C.D. at 5%	1.63	3.60	4.60	1.97	3.49	3.94	1.57	2.44	4.34	1.14	NS	2.66
BL	117.77	358.75	349.29	6.40	6.45	5.70	3.18	2.94	2.65	0.47	0.74	0.53
K8	103.55	301.75	272.79	5.37	6.10	5.52	2.75	2.73	2.56	0.54	0.76	0.59
C1	134.69	355.46	339.12	6.57	6.58	5.97	3.20	2.72	2.50	0.48	0.73	0.54
C2	121.65	289.00	301.99	7.04	7.17	6.75	3.27	2.64	2.45	0.88	1.66	0.92
H1	141.67	334.50	315.94	5.85	6.52	5.79	2.86	2.70	2.48	0.51	0.79	0.58
B1	108.17	310.34	284.25	6.09	6.20	5.77	3.09	2.73	2.65	0.54	0.76	0.54
Mean	121.25	324.97	310.56	6.22	6.50	5.92	2.51	2.74	2.54	0.57	0.90	0.62
F Test	32.38*	4.73*	5.70*	26.40*	9.77*	13.90*	16.97*	4.43*	5.51*	257.05*	194.04*	75.89*
S. Em±	2.60	13.35	12.62	0.11	0.12	0.12	0.05	0.05	0.04	0.01	0.02	0.02
C.D. at 5%	7.84	40.22	38.04	0.34	0.36	0.35	0.15	0.15	0.12	0.03	0.08	0.05

* Significant at P= 0.05

type C2 recorded the highest plant spread at 30 and 90 days. Accession BL recorded the highest number of branches per plant (15.01) at 30 days, accession C2 produced more number of branches per plant at later stages of growth at 90 and 150 days. Highest number of leaves per plant were recorded at 30 days in accession H1,

while accession BL recorded the highest leaf numbers 90 and 150 days. The lamina was longer in accession C compared to other accessions at all the crop growth stages recorded. Also accession C2 recorded the highest petiole length at all crop growth stages recorded compared to other accessions. Hedge and Krishnan (1992) in eleven *forskohlii* collections reported similar wide diversity even at 80 days of growth. Similar observations were also

Table 2: Yield characters recorded at 150 days in accessions of *C. forskohlii* (Pooled)

Genotypes	Fresh weight of tubers (g)	Tuber length (cm)	Tuber diameter (cm)	No. of tubers per plant	Volume of tubers (cc)	Density of tubers (g/cc)	Harvest index %
BL	288.89	14.17	1.63	21.36	225.08	1.29	31.01
K8	252.45	12.41	1.60	18.15	230.79	1.10	30.37
C1	314.79	13.96	1.46	23.95	262.80	1.20	25.75
C2	534.75	15.44	1.68	41.37	487.04	1.10	45.94
H1	275.49	10.66	1.52	19.97	251.53	1.10	28.67
B1	284.73	11.84	1.35	22.74	219.26	1.30	31.06
Mean	325.18	13.08	1.55	24.56	279.49	1.18	32.13
F Test	85.59*	37.66*	28.66	32.29	121.89*	63.97*	72.46*
S. Em±	11.31	0.29	0.02	1.49	9.33	0.01	0.83
C.D. at 5%	34.08	0.86	0.07	4.49	28.03	0.04	2.50

* Significant at P = 0.05

Table 3: Dry weight of tubers (g/plant), essential oil content (ml/100g), and acceptability scores of pickles of *C-forskohlii* genotypes

Genotypes	Dry weight of tubers (g/plant)	Essential oil content (ml/100g)	Taste and flavour of pickles	Texture of pickles	Overall acceptability of pickles
BL	40.31	0.10	3.48	3.79	3.42
K8	38.60	0.15	2.88	3.44	2.54
C1	42.61	0.09	3.54	3.48	3.36
C2	66.64	0.05	3.86	3.85	4.25
H1	41.96	0.08	3.83	3.83	3.39
B1	44.37	0.07	3.36	3.42	3.30
F value	7.64*	72.42*	3.43*	1.12	4.63*
S. Em±	3.77	0.004	0.19	0.20	0.25
C.D. at 5%	11.36	0.012	0.59	NS	0.75

* Significant at P = 0.05

NS - Non significant

reported by Prakash and Krishnan (1994) while evaluating the accessions and intervarietal hybrids in *C. forskohlii*.

Significant differences were observed among all the yield characters studied (Table 2). Accession C2 excelled in expression on yield characters like length of tubers (15.44 cm), diameter of tuber (1.68 cm), number of tubers per plant (41.37), freshweight of tubers (534.75g), volume of tubers (487.04 cc) and harvest index (45.94%). These results are in conformity with the findings of Hegde (1992). The results in the present investigations revealed that accession C2 in virtue of its higher tuber yields and harvest index can be exploited directly as a commercial cultivar.

The organoleptic evaluation of the pickles prepared from different accessions are presented in Table 3. The results revealed that pickles prepared from accession C2 were highly acceptable. The factors that were found to influence the overall acceptability of the pickles seem to be its constituent factors like taste and flavour, texture of the pickles and essential oil content and dry weight of the tubers. These results are in line with the earlier studies conducted by Pasra et al., (1996) in accessions of sweet potatoes for cooking quality. Poornima

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Physico - Chemical Composition of Barhal Fruit (Artocarpua lakoocha Roxb)

by
I. J. Singh, H. K. Singh and I. S. Singh

Abstract

There was great variability in physico-chemical characteristics of barhal fruits obtained from five different locations. Studies indicated that Akma germplasm has better potential for processing into quality products like R.T.S., Nectar, Squash and Jelly because of higher content of edible portion (69.84%), lowest content of seed (9.34%), medium seed content (20.85%) and attractive deep orange colour of the pulp. The fruit of Akma germplasm also recorded higher carotene, vitamin - 'A' and total mineral contents in the fruit.

Introduction

Barhal or monkey jack (Artocarpus lakoocha Roxb.) belongs to family Moraceae. The tree is large deciduous with spreading crown. It is found chiefly in moist or tropical forests. It also grows well in northern India where extremes of temperatures are experienced and rain is less than 60 cm. Seedling tree starts bearing fruits after 6-8 years of planting (Troup, 1921). One tree bears 200-300 juicy fruits. The edible orange or yellow portion of the fruit is a rich source of minerals, contains fair amount of ascorbic acid and vitamin-B. The food value of barhal mainly lies in its sugar content. The flavour of the fruits has been perceived

as a pleasant sub-acidic (Nakao Sasuka, 1976). The fruit is highly perishable but can be stored for 2-3 days at room temperature. Fruits are mostly utilized as fresh in India. This fruit has an untapped potential for processing into quality products due to its nutritive value, attractive colour and flavour of the flesh. However, no exploration work has been done in relation to processing possibilities which require proper understanding on physico-chemical composition of the fruit. Keeping this in view, the present study was undertaken to evaluate the barhal germplasm as there are no recognized varieties.

Materials and Methods

The investigations were carried out in the Post Harvest Technology Laboratory of N.D. University of Agriculture and Technology, Kumarganj, Faizabad-U.P. The fruits of promising genotypes procured from one village of Milkpur and two villages of Sadar Tehsils of Faizabad and two villages of Musafirkhana Tehsil of Sultanpur districts of UP during peak season and named after the names of places. Five fruits of each germplasm, replicated four times, were used for assessing the physico-chemical characters. Data on physical characters were collected by methods described in A.O.A.C. (1980). Pulp colour was examined by visual observations. The total soluble solids were determined with the help of a hand refractometer. Total acidity and ascorbic acid content was estimated by titrating the

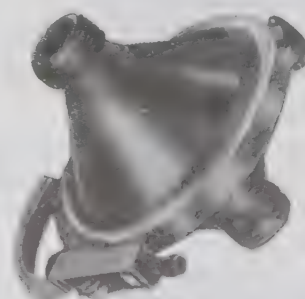
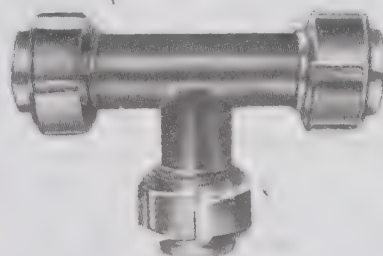
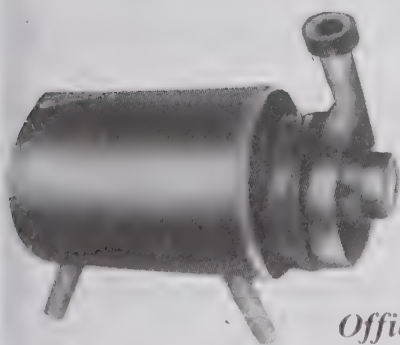
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Table 1: Physical characters of barhal fruits

Characters	Germplasm location					C.D. at 5%
	Akma	Gosai- ka Purwa	Kanpur	Jyotisan	Tarai	
Ave. fruit wt. (g)	177.28	153.95	206.68	125.45	219.0	44.06
No. of seeds/fruit	72.25	33.50	92.25	28.50	54.50	18.33
Moisture (%)	82.14	80.36	84.73	82.05	77.36	NS
Pulp colour	Deep orange	Deep orange	Light orange	Light orange	Yellow Light orange	—
Pulp (%)	69.84	49.41	69.18	71.72	68.18	4.53
Seed content (%)	20.85	12.33	19.88	15.01	21.30	3.48
Core (%)	9.34	38.26	10.94	13.27	10.52	3.28

Table 2: Chemical characters of barhal fruits

Characters	Germplasm location					C.D. at 5%
	Akma	Gosai- ka Purwa	Kanpur	Jyotisan	Tarai	
TSS (%)	18.00	17.63	21.25	17.25	19.75	1.78
Total acidity (%)	1.09	1.04	0.70	1.14	0.96	0.11
Pectin (%)	0.91	0.80	0.75	0.69	0.76	0.09
Ascorbic acid (mg/100 pulp)	6.50	16.28	13.90	9.60	4.27	0.69
B-Carotene (mg/100g)	246.68	221.75	187.97	172.63	200.25	22.96
Vitamin 'A' (IU)	148.00	133.05	112.78	103.57	120.15	13.77
Total minerals (%)	1.12	0.99	0.89	0.86	1.06	0.09
Calcium (mg/100g)	47.50	51.48	35.88	56.23	30.15	4.10
Phosphorus (mg/100g)	20.20	22.00	13.28	30.30	14.18	1.71
Iron (mg/100g)	0.45	0.43	0.36	0.48	0.42	NS
Reducing sugar (%)	14.75	12.13	17.62	11.81	17.57	1.27
Non-reducing sugar (%)	1.82	2.77	2.47	2.09	0.86	0.23
Total sugar (%)	16.67	15.05	20.22	13.90	18.48	1.32

juice against 0.1 N NaOH and 2,6-dichlorophenol indophenol dye solutions, respectively. Vitamin 'A', B-carotene, pectin, total minerals, calcium, phosphorus, and iron contents were determined as per methods suggested by Rangana (1986).

Results and Discussion

There was great variability in physical composition of barhal germplasm (Table-1). Fruits of Jarai germplasm showed the highest fruit (219.0g) followed by Khanpur

(206.68g) and Akma (177.28g). Average number of seeds per plant was found to be the lowest (28.50) with Jyotisan, while seed content was lowest (12.33%) with the fruit of Gosai-ka-Purwa germplasm. Fruits of Jyotisan showed the highest content of pulp (71.72%) closely followed by Akma germplasm (69.84%). The lowest content of core (9.34%) was noted with Akma fruits. There was little variation in the moisture content of fruits of different germplasm. The pulp colour of Akma and Gosai-ka-Purwa germplasm was deep orange while it was orange for Khanpur and Jarai and light yellow for Jyotisan germplasm. The literature pertaining to barhal variability is not available; however, Troup (1921) reported that barhal fruits contain about 65-85 seeds per fruit.

Chemical composition of barhal germplasm is presented in Table-2. The total soluble solids, reducing sugar and total sugar content were found to be highest with the pulp of Khanpur germplasm. In general, fruits of all the germplasm showed low content of ascorbic acid (4.27 to 16.28 mg/100g pulp) and medium content of pectin content (0.69 to 0.91%). The fruit of Akma germplasm contained the highest content of carotene (246.68 mg/100g) and vitamin 'A' (148.00 IU). The total mineral content was also highest (1.12%) with the Akma fruits followed by Jarai (1.06%) however Jyotisan fruit contained the highest amount of calcium (56.23 mg/100g), phosphorus (30.30 mg/100g) and iron (0.48 mg/100g).

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Performance and Pickling*forskohlii*

Aggarwal *et al.*, (1997) in varieties of ber for preparation of chuharas and Doreyappa Gowda and Ramanjaneya (1995) in mangoes for juices preparation.

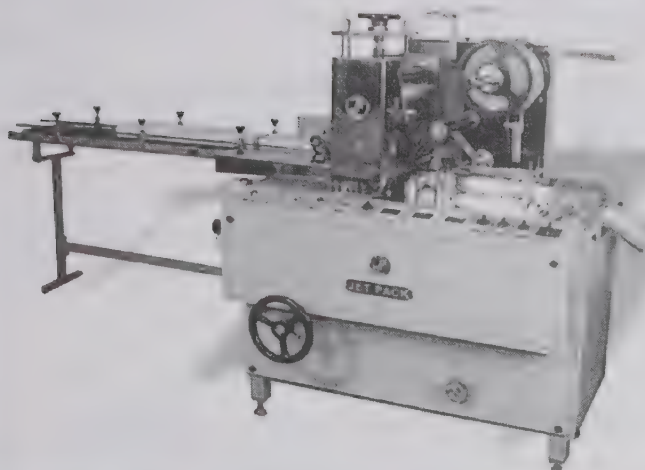
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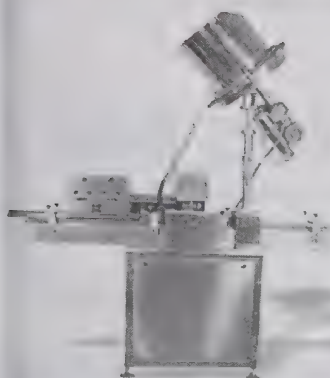


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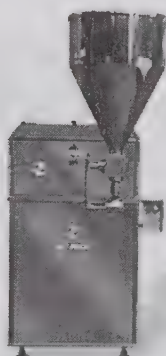
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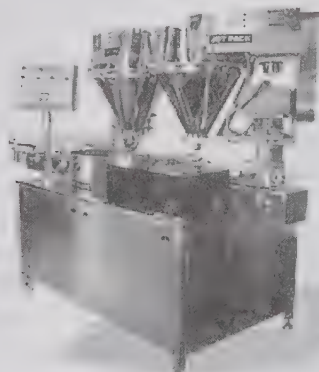
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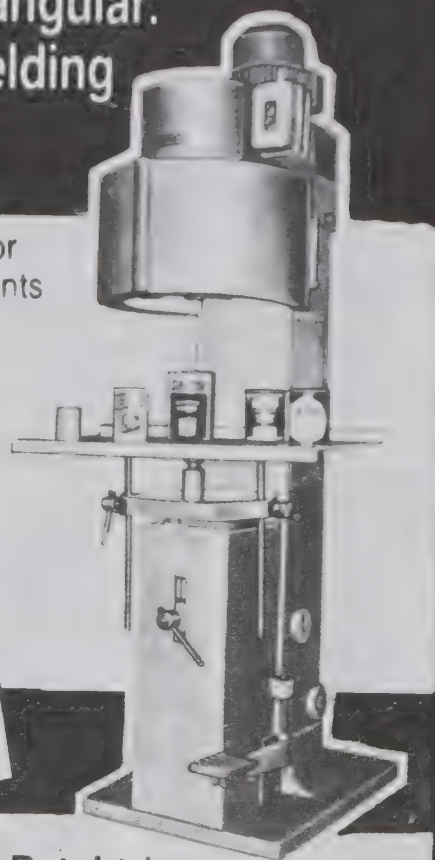
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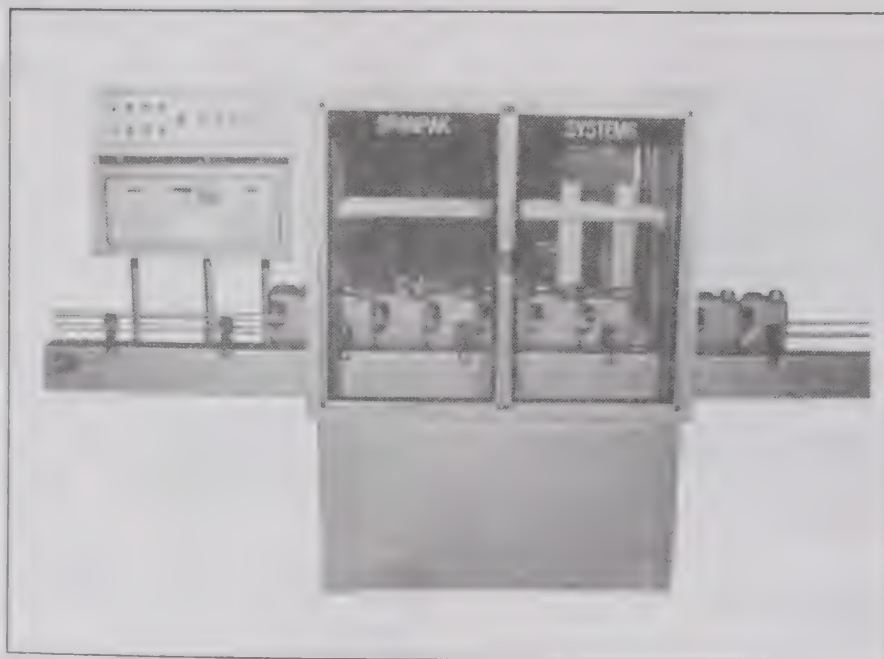
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COMPANY NEWS

NESTLE (I)

The world's largest bottled water manufacturer, Nestle, had entered the Rs 350 crore Indian bottled water business, close on the heels of other multinational majors like Danone, Coca Cola and Pepsi. The company now enters in the mass market under the Nestle 'Pure Life' brand. A one litre bottle will be priced at Rs 12, which is higher than what the competition sells at today. But Nestle promises to deliver more in terms of quality, purity and safety.

Worldwide, Nestle registers sales of Rs 18,000 crore from the water business, about 9 percent of its total turnover.

Coke launched Kinley brand of bottled water and Pepsi entered the market through Aqua Fina, at that time Nestle entered the high segment with two international brands "Perrier" and "San Pellegrino". It currently has a presence in about 130 countries through 70 brands.

The company believes there is a tremendous potential for growth in the Indian market for a pure, safe and hygienic water. This is also the first market for which it has designed a tamper proof 3D hologram.

Nestle has also set the Indian curd market churning by launching plain curd under the brand name "Nestle dahi". So far, the product has been launched in Delhi only.

The Indian curd market is a whopping Rs 4.5 crore per day. In the Indian curd market "Dahi" is the second largest

form of milk usage following tea and coffee-making in Indian homes. Almost 10 percent of the total milk purchased from shops is converted to dahi in households. So, the total market for dahi in urban India is a huge 2200 MT valued at Rs 4.5 crore per day.

Nestle plans to promote its product as a ready-to-eat product for out-of-house or in-house consumption. Estimates are that most curd sold in India is from the unorganised sector, the local shop keepers.

FRITO LAY

PepsiCo's subsidiary Frito Lay India is all set to launch about six new products in the Indian market in a bid to boost its sales and market share in the Rs 1,600 crore salted snack market. In addition to this, the company is also looking at launching new brands as well in the current year.

According to company officials, both palm and finger snacks will be launched by the group which is currently test marketing its peanut based Nutyumz in some cities of India.

VEUVE CLIQUOT

Veuve Cliquot, a leading international champagne house, will open a representative office in India to sell its brands like Le Grand Dame, Vintage Reserve and Rose Reserve to every segment instead of confining itself to the premium segment. India will automatically

become a good market for the drink. The immediate reason for opening an office here is the expected lifting of quantitative restrictions (QRs) in the export-import policy, which further anticipates a booming market in near future.

The Cliquot brand of wines have been in India for over 100 years. With the removal of QRs, Cliquot would be able to sell its premium brands at less than half the price that five-star restaurants charge for them. Soon wine will become an important segment in the Indian market, which is known for the consumption of whisky, rum, brandy and beer at present.

DA VINCI/QWIKY

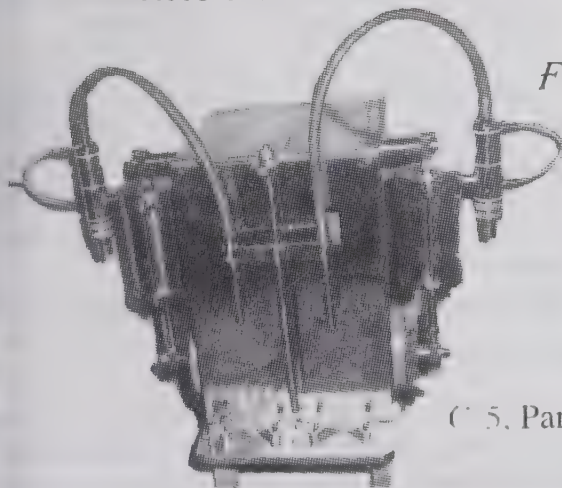
The Chimayo chains owned specialty coffee pub brand, Qwiky's has entered into an exclusive tie-up with US based Da Vinci Gourmet who are the world leaders in the manufacture of flavoured coffee syrups. The tie-up will result in the marketing and distribution of flavoured Da Vinci coffee syrups in India. The three categories of Da Vinci coffee syrups available are the classic, sugar free and all natural and come in more than a hundred flavours.

The company intends to market its syrups online through the official website qwikys.com in addition to departmental stores across the country and Qwiky's outlets. The syrups have been specially formulated to suit the Indian market and weather conditions.

The coffee syrups, in addition to en-

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hancing the flavour of traditional coffee drinks and sodas, can be used in creating flavoured teas, desserts, sauces, cocktails and appetisers.

SHAW WALLACE

Liquor major Shaw Wallace and Company Ltd (SWC) is planning to launch a mineral water under the brand 'Hi Five' and a 'Lal Toofan' Soda. Both names are already well known in the market as the company's beer brands. According to a spokesman, there is a likelihood of the company resorting to surrogate advertising through the promotion of the mineral water and soda brands. Meanwhile, SWC recently launched a Hi-Five Premium Lager and Lal Toofan Premium Strong Beer to further consolidate its presence in the beer sector.

MILLENNIUM ALCOBEV

Millennium AlcoBev, will no longer be an extension of the UB Group of companies but will be positioned as a full-fledged alcoholic beverages company according to the Group's chairman, Vijay Mallya. The company has plans of making its foray into all categories of wine and spirits in addition to expanding its existing brands of beer.

According to Mallya, the company is keen on acquisitions as this will enable it to enhance its product range and add value to it. He further explained that acquisitions were not necessarily restricted to beer brands alone but various other products such as whisky, vodka, gin and rum.

SUPREMA

"Suprema" offers hygienic products, untouched by human hands and the very best in quality. "Suprema" brand of ice-creams also manufactures full range of normal ice creams like Ice Stick, Double Bars, Choco Bars, Kulfi Kandy's, Cones, 50 ml & 100 ml Cups, Family tubs of 500 ml, party packs of 1 ltrs, Rolls of 1.5 ltrs & Bulk packs of 4 ltrs with different flavours plus sauces and toppings. The price range is from Rs 5 to 600. "Suprema" brand of premium ice-creams are made of fresh fruits manufactured on Italian machinery.

All the items manufactured are pure vegetarian. This marketing company also has the agency of Softy Machines of one of the leading brands of softy machine manufacturing company. These machines are available at very affordable prices, which can be afforded by any provision store, general stores, S.T.D. booths, etc. The company has supplied around 25 softy machines all

over Mumbai to dealers who serve consumers with soft ice cream for just Rs. 5.

SEAGRAM MANUFACTURING LTD.

Seagram Manufacturing Limited has introduced its Royal Stag Deluxe Whisky, one of the most preferred premium quality whisky brands in India, in a new pack with a contemporary design.

Royal Stag comes from its unique blend of imported scotch malts and the best domestic grain spirit. The new pack offers its discerning consumers a modern and contemporary choice with excellent taste, premium quality and distinctive smoothness, which is the hallmark of the brand.

Royal Stag Deluxe Whisky will be available at an MRP of Rs 420 for the 750 ml pack, Rs 120 for the 375 ml pack and Rs 59 for the 180 ml pack in Maharashtra.

GILBEY'S

Gilbey's Green Label, the fastest growing brand in the regular whisky segment, has introduced tamper-proof, easy-to-carry and convenient pack-Gilbey's Green Label Flexipack. The Flexipack has been designed to offer certain distinctive benefits to consumers. The new brand has a unique, tamper-proof spout that prevents spillage as well. The consumer breaks open the spout and then safely seals it again.

The tamper-proof seal recalls Gilbey's renowned promise of guaranteed and genuine offering. Encased in bottle green and a rich label with gold trimmings, Gilbey's Green Label Flexipack has an aura of supreme quality, premium style and modernity. Available in 180 ml size at a price of Rs 38, the pack has been launched in Maharashtra and will be rolled out nationally soon.

RED CHAMBER

US-Based Red Chamber, the largest importer of Indian seafood, is aiming to shift its reprocessing base from China to India.

Red Chamber proposes to invest \$1.3 bn directly in India in areas like marine products procurement, processing and value-addition. This would in effect mean a shift in the company's operations from China. The raw material sourced in India would be processed locally instead of transporting them to China. The initial investment would be in Andhra Pradesh that has a strong seafood industry.

The company's investment proposal has been termed as a major success in the international seafood show, which

concluded in Visakhapatnam recently.

Red Chamber will invest in value addition which would give a boost to value-addition in marine product exports.

Good labour laws, rapid development of industry and marketing facilities in India has impressed companies like Red Chamber and hoped that the Aquaculture Authority Bill would boost the growth of the industry.

India exports 43 per cent of its marine products to Japan, 19 percent to the US, 14 per cent to Europe and 12 per cent to China.

UB GROUP

The Vijay Mallya-controlled UB Group has embarked on a restructuring of its brand portfolio wherein the number of spirits brands will be pruned from 74 to 60. Anant Iyer, divisional vice-president, spirits division, stated, "Indian Salute whisky has been recalled from the Herbertsons portfolio as it did not perform up to the expectations." But at the same time, the group has reintroduced McDowell's Black Stallion regular whisky which was withdrawn three years back. The company has extended the Bagpiper brand of whisky to the rum segment as well. It has revitalised certain brands like McDowell's Diplomat in the regular sector and McDowell's Signature in the medium segment.

Some of the key brands which will remain include Blue Riband gin, Romanov vodka, Bagpiper regular whisky and McDowell's Vintage Classic in premium whisky.

The Signature whisky was relaunched with new packaging, priced low at Rs 475. Signature achieved 150 per cent jump in sales for the first six months of the current fiscal.

In the scotch whisky category, the company sells its Black Dog at Rs. 1,710 for a 750 ml bottle. The company has plans to import a range of life style products into the country and market them through luxury retail outlets. These will include international brand wines, liqueurs, spirits and champagne.

The company is currently working on importing wines from Argentina, France, Australia, Chile, Italy, South Africa and scotches, cognac, vodka, bourbons, Canadian whisky, tequilas, Marie Brizard, liqueurs, aperitifs and Vermouth bottled in their place of origin.

HERBERTSONS LTD.

Honey Bee Classic Brandy is now available in a new look, from Herbertsons Ltd. which is a part of the UB group. The brandy will now be available in all the

tail outlets in Andhra Pradesh in a brand new packaging. The new look is more contemporary and attractive.

With the state of Andhra Pradesh being one of the major brandy markets in the country, company officials have admitted to being confident about the new packaging getting a favourable response. The current Herbertsons portfolio includes four brands in whiskey, three in white spirits and one in brandy.

RADICO KHAITAN

In a bid to counter the ban on liquor advertising, the Rs 231 crore Radico Khaitan has chalked out an interesting plan to promote its 8 PM whisky. The group shall soon be launching 8 PM apple juice to leverage its whisky brand.

According to Poonam Chande, brand manager, 8 PM the brand of apple juice advertising is for earning profits as well as increasing the volumes. Besides, the apple juice name will result in high recall for 8 PM Whisky.

The product will initially be test marketed in northern India and eventually launched in the west and south of the country. The apple juice will be available in 750 ml glass bottles that resemble whisky bottles though the exact quantity of juice shall be 700 ml in accordance with FPA regulations.

The company will launch its Contessa Rum with a new look - the logo of a ship. Available in two variants - Contessa Select and Contessa Rum - the product is targeted primarily at the defence market, of which it enjoys a 25 per cent share. However, the company also intends to strengthen the new-look brand's position in the civilian market. Contessa Select is the premium brand priced at Rs 180 for a 750 ml bottle, with the additional excise taxes varying from state to state. Contessa Rum is priced at Rs 130 in the regular segment.

M.B. INTERNATIONAL/PATON'S

Delhi-based M.B. International has tied up with Paton's, a \$600 million Australian company known for its Macadamia chocolates to market its chocolates through dealers all over the country. In the first phase it would be launched only in the markets of northern India. As part of its promotion plans, the company would organise publicity events wherein it would invite the Australian cricket team to India.

Patton's is also known for other quality food products like jams, barbecue sauces, honey and vegetable oil, which will be in the market soon. Paton's has a presence in almost 20 countries.

MARICO INDUSTRIES LTD.

Marico Industries Ltd. is considering restructuring its brand positioning strategy, under which it had launched Saffola salt as a premium priced salt. According to Pranab Datta, CEO (healthcare division), Marico Industries, Saffola salt has not lived up to the company's expectations, falling well short of targets.

The branded salt was launched some time back in PET jars at a retail price of Rs 20 per kg. The price was a significant premium over ordinary iodised salts.

Later, a second variant - providing 10 per cent reduction in sodium - was launched in a pouch pack at a retail price of Rs 10 per kg. Competitor Hindustan Lever recently introduced 'Annapurna premium salt' at a similar proposition to directly take on Saffola salt in the niche market. Annapurna salt is priced at around Rs 30 for 500 gm. With a fresh wave of competition arising and new brands being launched, the subsequent growth in the combined promotional clutter is expected to expand the nascent premium salt market that could witness better growths in the coming months.

ESSEL PACKAGING/BERICAP

The Foreign Investment Promotion Board (FIPB) has approved Essel Packaging's proposal to set up a 51:49 joint venture (JV) with Bericap Holding GmbH of Germany for manufacturing caps and closures for carbonated soft drinks.

The joint venture will commence operations at Murbad in Maharashtra soon. The project is being set up at a cost of Rs 14 crore. The company has manufacturing facility at Murbad for caps and closures. The venture will also set up its own facility at the same location, which has been leased out by Essel Packaging.

Meanwhile, the company plans to raise a loan of \$20 million to be utilised for part payment of the Propack deal which was acquired recently. The company will be acquiring Propack through a special purpose vehicle (SPV), Propack Mauritius, thereby having one more wholly owned subsidiary in Mauritius, along with Lamitube Technologies, to consolidate operations.

COCA-COLA

Soft drink major Coca-Cola has decided on restructuring Indian operations, by separating the operations and the marketing divisions into two focus areas.

The company has shifted its focus from the soft drink business to beverage segment in a big way. The company

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would launch new flavours in its juices range soon. In addition to the mango flavour of Maaza, the company intends to introduce orange and pineapple flavours. Kinley (brand) water had recorded a 14 per cent growth last year besides a one per cent growth in market share.

Recently, the company launched iced tea, cold coffee, milk, mineral water and juices.

The US soft drink major has decided to regionalise its brand strategy in India by pushing two or three brands in each region instead of focusing on the entire portfolio of brands. In its cost-cutting drive Coca-Cola has turned the emphasis on performance-related appraisals for its 600 odd managerial staff out of a total 6000 workforce.

FOSTER'S

Foster's, an Australian company, is gearing itself for a larger market penetration in the Indian beer market.

In order to meet increased demand, the company is in talks with some Indian breweries for tying up capacities. Outright acquisitions or entering into long-term contracts are some options before the company, in addition to establishing more greenfield facilities on its own.

The launching of Foster's beer in Pondicherry marked the entry of the brand into South India, recently. The brand has been available only in Maharashtra, Goa, Daman and Diu in the past 2 years.

While Foster's Brewing Group Australia has 74 per cent stake in Foster's India, the rest is with the D C Kothari Group. Foster's became the first major international brewer to invest in India, when it invested Rs 60 crore in a green field brewery facility, with a capacity to bottle two lakh cases per month, in Aurangabad, Maharashtra.

Having garnered one-third share of the lager beer market in the states where it is already available, Foster's has now set its sights on the south. Starting with Karnataka and followed by Andhra Pradesh, it should be entering all southern states very soon. By the year-end, the company plans to launch Foster's lager beer in cans.

South accounts for 40 per cent of the 70 m cases per annum. Indian beer market is growing at 10-12 percent every year.

HIGHLAND DISTILLERIES

British scotch whisky major, Highland Distilleries is planning to set up a 100 percent subsidiary in the country.

The company, which is rated as one of the finest makers of single malt whisky, is planning to import its international brands of scotch whisky and the Remy Cointreau brands of wine and spirits into the country after the removal of Quantitative Restrictions (QRs.). The managing director of the India liaison office, Highland Distilleries confirmed that the company will bring into India its international range of products. The company plans to bring to India, the famous Grouse Scotch Whisky (its No 1 brand) and other brands such as Macallan, Highland Park, Black Bottle, and Gloag's London Dry Gin.

The other products lined up for India are Black Bottle Premium, Brig O' Perth Premium whisky, Bunnahabhain 12 YO - Malt whisky, Fairlie's Light Highland Liqueur, Glenturret Malt Liqueur, Glenturret 12 YO Malt Whisky.

Internationally Highland Distilleries has a non-US sales and distribution joint venture with Fortune Brands (Jim Beam) and Remy Cointreau (Highland Distillers' distributor in the United States).

The combined portfolio includes category leaders such as Remy Martin cognac, Famous Grouse and Macallan Scotch whiskies, Jim Beam Bourbon, Cointreau liquors, Piper Heidsieck champagne, and Geyser Peak wines, as well as a number of establishment third party brands. Remy Cointreau is one of the world's major wine and spirits groups. It owns and distributes prestigious brands through three divisions: Cognac Remy Martin, Champagne Piper-Heidsieck and Charles Heidsieck, and liquors and spirits with Cointreau.

HINDUSTAN LEVER LTD.

Fast moving goods major, Hindustan Lever Ltd. will review the viability of its tea brands in the lower segment, as part of its rationalising exercise. The company has 10 tea brands, of which half are in the lower price segment and the review would help the company focus on the premium brands where margins were higher.

HLL's popular-priced tea brands has grown by around 5 per cent, the premium brands have grown by around 15 per cent. Growth in the company's packet

tea business is led by the robust growth of 15 percent in premium tea brands which were packed with relaunches and market activities.

Red Label has been relaunched with the incorporation of proprietary Assam Super Tasters to offer an optimum combination of taste and strength.

HLL has embarked on a massive brand restructuring exercise, with the company deciding to prune its brand portfolio from 110 to a final 30 power brands. These 30 power brands account for 75 per cent of HLL's turnover at present.

The company posted a 22.4 per cent growth in profit after tax at Rs 1310 crore despite a mere 4.5 per cent jump in topline growth to Rs 10,604 crore in 2000.

MCDOWELL & CO. LTD.

McDowell and Co. Ltd. spirits division of the United Breweries evolved a consolidated package involving merging, stand alone distilleries and buying other distilleries.

McDowell & Co. will buy 15 distilleries with which it has subcontracting arrangements. The company will become minor stake holders and buy out some of their brands.

At present, McDowell has an 18 million cases market and commands 20 percent of the market share. The aim is to capture 30 percent of market share. The company will also merge six stand alone distilleries into the company. McDowell has nine distilleries and the merger will result in 15 distilleries for the company. Udaipur distillery, Serampore and Mysore distilleries are some of the units being merged with the company.

BACARDI MARTINI

Liquor major Bacardi Martini India Ltd. a joint venture between Gemini Distilleries and Bermuda-based Bacardi Ltd., has launched Bacardi Carta Blanca in 180 ml. packs. According to the company, this pack will enhance the sales by making it more accessible in all the segments in addition to providing value for money to the customers.

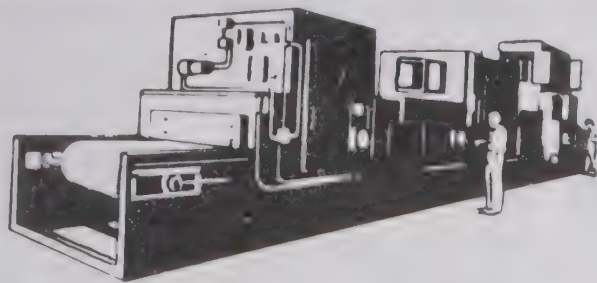
Priced at Rs. 95 plus 20 per cent tax it completes the Bacardi portfolio which already has pack sizes of 750 ml, 375 ml and 60 ml. Bacardi Carta Blanca was launched in 1998 in India and has managed to capture a sizeable share in the premium segment.

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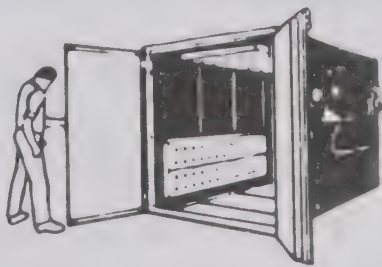
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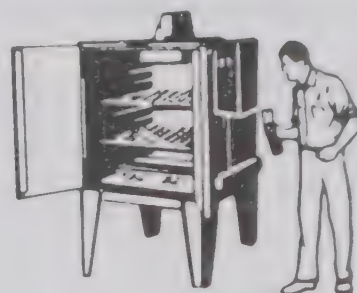
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NEWS & NOTES

BROAD POLICY ON DAIRY SECTOR DEMANDED

"The introduction of an open door policy of globalisation and the WTO have posed various threats for the dairy sector. To overcome these challenges, the Indian dairy sector would have to become competitive at the global level which requires a broad policy support from the government".

To achieve this, the government needs to evolve a broad policy for the dairy sector concentrating on areas like

increasing production of milk through improved animal nutrition and productivity, achieving quality standards as prescribed under the World Trade Organisation (WTO) and a stronger research and development support, a senior official of the Indian Dairy Association (IDA) stated.

EFFORTS ON TO BOOST BIHAR'S LITCHI SALES

Bihar hopes to significantly boost its sale of litchis in the next season to other parts of the country and export overseas. The state is banking on the cold storage and pre-cooling plants that are being installed at Muzaffarpur to catalyze, the sale of the temperate fruit. Muzaffarpur, which is 100 km from Patna, is renowned for its juicy Shahi litchi. With the move to build cold storage facilities, pre-cooling plants and atmospheric control containers at a cost of Rs. 15 million, export is expected to go up to 200 tonnes in the season. Emphasising the importance of the new infrastruc-

ture being created, sources said pre-cooling plants protect litchis by storing them at a temperature of between 2 and 4 degrees Celsius while cold storage facilities keep the fruit at between 6 and 9 degree Celsius. The atmospheric control container protects litchis during long transit. Muzaffarpur litchis reached Lon-

don, via Mumbai, last year in 45 days in such containers.

KARNATAKA TO HAVE FIVE FOOD PARKS

Karnataka State Agricultural Produce Processing & Export Corporation (KAPPEC) plans to join hands with the private sector for promoting food processing units in the state. The state has already planned to set up five food parks.

Of the five, the Centre has already

vegetables including potatoes, onions and mangoes. KAPPEC, which is an exporter of rose onions, has sold around 17,000 tonnes mainly to countries in Southeast Asian countries like Singapore, Malaysia, Sri Lanka and Bangladesh. Rose onions, which are slightly blackish-pink in colour, are more pungent than regular onions and are used mainly as 'pickled onion'. KAPPEC is also engaged in exports of niger seeds and has exported around 4,000 tonnes to the US and Europe.

HIMACHAL PRADESH TO GET INTO WINE PRODUCTION

Himachal Pradesh will soon wear the mantle of the country's top producer of high quality wines. The state's horticulture minister, Narinder Bragta, stated that considerable work had been put in to set up two wineries in the state, the MoU for which was earlier signed between the Government of Himachal Pradesh and two private sector companies.

A new company called Him Indage, has been floated comprising the two private firms - Indage of Mumbai and Group Taillan, a leading wine manufacturers of France - the public sector Horticulture Produce Marketing Corporation (HPMC) and the state government. The head office will be in Shimla and wineries at Pragatipur in Shimla district and Nagwal in Mandi district. The private partners, who would buy back the new joint venture's products, are to hold 30 per cent of the equity each while the HPMC and the state government are to take 10 per cent each. The

remaining 20 per cent is being offered to the state's fruit growers.

Apple and plum wines which are dubbed as health drinks by the minister are expected to be the initial products. Grape wines will be launched as and when sufficient wine grade grapes are available in the state.

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approved two parks - Malur and Bagalkot. Incidentally, the Centre is providing assistance to the tune of Rs. 5 crore per park. The Corporation has gone ahead and prepared a blueprint for a pilot project at a cost of Rs. 19.6 crore.

The new units would be used to process a wide variety of fruits and

WORLDWATCH HAILS INDIA'S MILK REVOLUTION

Worldwatch Institute, an environment-oriented group based in Washington, has praised India's milk revolution, which enabled the nation to move ahead of the United States, and become the world's top milk producer.

India increased milk yield phenomenally using farm by-products and crop residue rather than grain for feed, which is a remarkable achievement. It was able to expand protein supply without diverting grain from human consumption to cattle.

"Uniquely converting crop residue into milk, India has successfully expanded milk production. Between '66 and '00. India's milk production increased from 0.7 litres per person per week to 1.5 litres. This is not high-level of consumption by industrial country standards, yet a welcome expansion of the animal protein supply in the protein hungry country, according to Lester Brown, chairman of Worldwatch Institute.

In India, both water buffalo (good at converting coarse roughage into milk) and cattle figure prominently in the dairy industry. The dairy industry structure in India is unique, as milk is almost entirely produced by small farmers.

UNCLEAR TAX STRUCTURE CANS GROWTH OF PROCESSED FOOD COMPANIES

Processed food industry has great potential, but is not growing. Instead, the Rs. 30,000-crore industry has been witnessing degrowth for quite some time.

Largely unorganised current statistics show that only 2 per cent of total food gets processed in the country, including biscuits, jams, sauces, atta, milk and a few meat products.

This is largely because of the high taxation policy, coupled with a poor infra-structural growth. And now, the government is about to remove QRs on more products, allowing free import of food items.

The domestic industry is reeling under high excise duties and sales tax and, there is no clear policy about which products have to be taxed and the quantum of tax to be levied. There is a lot of ambiguity, as far as tax structure is concerned for value added versus original products and even branded versus unbranded products.

Food processing industry is significant because it serves as a link be-

tween industry and agriculture, with a strong rural bias. "With 70 per cent of population living in villages, the industry has the potential to grow," sources say.

At present, the price at which the farmer sells his produce is less than what the manufacturer pays for it, the reason being that there are a lot of intermediaries. Except sugar all other food produce cannot be sold to the manufacturer directly under present policies.

RULES FOR NEW RECYCLED PLASTICS MANUFACTURE AND USAGE

The definition of foodstuff now includes ready-to-eat food and food products, fast food, processed and cooked food in liquid, powder, solid or semi-solid form. This is part of the recycled plastics manufacture and usage rules finally notified by the Union Environment Ministry earlier under the Environment (Protection) Act. If a State comes up with a law that goes further than this or clashes with it, the Central law would take precedence.

One change from the draft rules framed earlier is in defending and empowering the enforcement authorities "for effective implementation". For manufacturing and recycling, the job is that of the State Pollution Control boards and in Union Territories that of Pollution Control committees.

For enforcing the rules on use, collection, segregation, transportation and disposal, the job is that of the district collector or deputy commissioner, unless the local government has already designed somebody else for the work.

Subject to the foodstuff precautions, any person may manufacture plastic carry bags or containers on certain conditions. A carry bag should not be less than 20 microns thick. This is to add economic value to the bag so it is discarded easily.

There has to be colour distinction in plastic bags and containers. Those of "virgin plastic" have to be in a natural shade/white; processing have to meet the guidelines set by the Bureau of Indian Standards.

Recycled plastic bags manufacturers with printing facilities have to label the product recycled and indicate the percentage of recycled material used.

They also have to mention whether the bags are made from "recycled material" or are of "virgin plastic".

CUP OF GOOD CHEER BRIMS OVER

The governments of India and Pakistan are at logger heads but businessmen have buried the hatchet and decided that goodwill between two countries should be established. Members of the tea growing fraternity have come back charmed from their recent trip to Pakistan. They discussed the softer human aspects that the beverage should flow freely between the two countries, irrespective of 'external' factors.

The Pakistan commerce ministry has assured businessmen that there will be no visa hurdles for them. India exported around 3 million kg of tea to Pakistan last year and the target is to increase it to 7-8 million kg. The aim is also to gradually increase supply to 10-15 per cent of Pakistan's annual requirements.

Pakistan buys most of the tea consumed by it, either from Kenya or Sri Lanka. Indian, especially Darjeeling tea, is considered too-weak, through fragrant. However, a memorandum to increase the consumption of Indian tea in Pakistan has been signed and will be in force for five years.

To keep the goodwill flowing, a core group will also be established within the two countries to periodically meet and review tea imports by Pakistan.

NDDB TO SET UP INDIA'S FIRST FRUIT & VEG TERMINAL MARKET IN BANGALORE

The National Dairy Development Board (NDDB), in association with the Karnataka state government, is all set to establish the country's first vegetable and fruit terminal market at Kannamangala near Bangalore. In the first phase, the Rs. 150-crore project is expected to herald a radical change in horticulture marketing in the country by eliminating middlemen and establishing a state-of-the-art supply chain network.

The project would comprise central auctioning and storage facilities, controlled temperature for receipt and dispatch of produce, 10 wholesale shops, crate stores, amenities like banks and post office, farmer's training centres cash and carry shops.

The terminal market is being designed to handle 30 per cent of the Bangalore market with a provision for 100 per cent expansion in the future. The processing plant would handle 50,000 Mt. fruits and vegetables per year. In addition to these, the project

envisages cold storage facilities for bulk produce like potatoes in the future and a processing units for fruits and vegetables.

ANNUAL FOOD MATERIALS WASTAGE WORTH RS. 70,000 CRORE

The food wastage in the country amounts to Rs. 70,000 crore, revealed a Central Food Technological Research Institute (CFTRI) official. It can be prevented by adoption of proper technologies for increasing the shelf life of fruits and vegetables by development of cold chains, value additions and cleaner technologies for processing.

Per capita food intake will rise due to improved life standards in India in the future. For that, India will have to produce 50 per cent more by the year 2025. The genetic yield potential of rice is about 10 tonnes per hectare in the tropics, but the farmers obtain only about 5 tonnes per hectare on an average. This yield gap is due to losses caused by disease and pests, biotic stresses and the use of suboptimum management practices.

FOR THE JAPANESE, SAKE'S HANGOVER

The famous Japanese drink 'Sake' a beverage fermented from rice until recently was more than a mere drink for the Japanese. While the older generation treats it with reverence, the youth are increasingly shying away from it.

Sake is a distilled beverage; although the alcohol contents is around 15 per cent, it is unlike other spirits like vodka, whiskey or brandy.

It is a wonderful drink and does not cause a heavy head (hangover). Premium 'sake' is made without any additives or preservatives. There are approximately 1500 sake breweries — called *kura* in Japan, but their number is fast falling. Each *kura* has its own type of sake, a number of varieties are available.

But the Japanese youth are showing a growing preference for beer, whisky and vodka.

DOMESTIC BREWERS BRACE UP TO MEET COMPETITION

The Indian breweries are on an expansion spree in a bid to face the challenge from world's leading breweries when they enter India once the

Quantitative Restrictions (QR) are removed from April 1st. Shaw Wallace, the leader in Indian beer segment, has seven breweries in different parts of the country and has plans to set up four more greenfield breweries to step up their capacity. Charminar Brewery in Andhra Pradesh which produces 25.64 lakh cases, will now expand and produce 57.69 lakh cases a year.

The Bangalore-based United Breweries is also seeking to expand the capacity of its brewery at Hyderabad, from the existing 24 lakh cases a year to 48 lakh cases. It further plans to shift to the new high gravity brewing technology under which beer concentrates are first manufactured, up to the filtration storage point after which it is diluted with special carbonated di-oxidised water. The company will incorporate this new German technology for high gravity brewing which will enable them to produce 48 lakh cases per annum without the requirement of a fresh license. While the conventional expansion will cost around Rs. 5 crore, the new technology will cost only Rs. 1.50 crore.

UB has also entered into an agreement with the local Vinedale Breweries for contract manufacture and has taken over the Castle Brewery near Kolkata.

Australian major, Foster's Brewing Group has already set up a state-of-the-art brewery at Aurangabad, after establishing second position in Maharashtra beer market which is the largest market for beer in the country. It is trying to penetrate the Tamil Nadu and Andhra Pradesh markets, the second and third largest.

The Singapore-based Asia Pacific Breweries Ltd., owners of the premium Heineken brand, is scouting for a suitable tie-up with an Indian company for introducing the brand in the country.

They have visited some of the UB breweries in the country. Another brewing major, Calsburg, is knowing to be scouting for a similar arrangement in the country.

GOVT. URGED TO LIFT BAN ON EXPORT OF ONIONS

Indian Agro Produce Exporters Chambers of Commerce has urged the government to remove the ban on export of onion; to bring onion under OGL list and to remove onions from the Essential Commodities Act.

Presently, only one major criteria influences the government's approach

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on onion policy. That is, the price at which onion is available in the local retail market which is the ruling price in Delhi. While the prices of all other vegetables have risen due to various reasons, onion prices are being singled out for supporting the unfavoured policy. Time has come for the government to show genuine concern for the interest of all concerned in the onion sector. Being an agro based economy, the government is responsible for the needs for the poor farmers.

The common man depends on onion as an essential item and to protect his interest, monitoring mechanisms can be established to work as circuit breakers to suspend exports when the market gets heated up and the prices in the domestic market shoot up beyond reasonable levels.

Government's policy has not only affected the farmers badly, but has compelled foreign buyers to look for alternative sources due to doubtful availability of Indian onions throughout the year.

REVIEW MEETING OF SALT LICENSEES IN GUJARAT

A Review Meeting of salt licensees of Gujarat, was organized by Rajkot branch of BIS at Gandhidham which is the biggest salt field in India.

Shri O.P. Khullar, Deputy Director General, Western Regional Office, BIS stressed on the importance of producing proper quality of salt by the manufacturers as per Indian Standard as salt is an essential part of human diet. Salt is also used in chemical industries as raw-material.

The licensees wanted the market fee levied by BIS to be reduced. They further pointed out that the STI requirement of marking batch number on daily basis on the salt packets has created practical problems for the manufacturers. The licensees also requested for Workshop-cum-Training programme for Quality Control Personnel for administering the proper method of tests and BIS to organize one ISO 9000 appreciation programme for local salt manufacturers. BIS was requested to strengthen advertisement campaign for the ISI marked products for the benefit of common consumers.

The failures of the samples observed in independent testing, various non-conformity/deviations observed during the periodic inspections, etc, were highlighted. Attention was drawn of the participants towards the respon-

sibilities of the licensees. They were requested to send their production statement with the marking fee and also the completed renewal applications in time.

There are nearly 200 small packing units in Gandhidham whereas only 14 have BIS licences.

BIS officers clarified that at the manufacturers end the requirement of iodine content is 30 ppm and at the distributors' end the requirement is 15 ppm is applicable. If however, the salt had been lying in the stock of the manufacturer for a considerable time, the requirement of 15 ppm is applicable as iodine content decreases with time in storage.

NO FOREIGN LIQUOR FLOOD, THANKS TO CVD

The government's decision to impose a countervailing duty (CVD) on liquor imports once quantitative restrictions are lifted on April 1, has poured cold water over the plans to MNC subsidiaries as well as some Indian liquor barons who had planned distribution of imported liquor in the country through their existing network.

The CVD will be benchmarked against the excise duty imposed by the various states, ranging from 200 percent in Maharashtra to 40 percent in Rajasthan. The Indian liquor lobby has been asking for a CVD of 200 percent. More importantly the CVD will be launched on the MRP.

To add to the woes of the MNCs, the finance minister has ignored their demand to lower the customs duty on liquor from the percent 222 percent to 70 percent.

Commenting on the issue, United Distillers and Vintners (UDV) CEO Deepak Roy said "With the proposed introduction of CVD, it is unlikely that there will be any legitimate market for global premium spirits and the upper-end consumers will not have easy access to global premium brands."

Though Bacardi-Martini India Limited (BMIL) had tied up with William Grant & Sons for marketing, there could be a rethink on the issue.

Allied Domecq chief executive officer Srikant Illuri adds. "It came as a surprise. Right now, the window of opportunity doesn't show itself."

Most of these companies have now come round to the view that the CVD will make their products frightfully expensive. The Scotch Whiskey Association, an association of such com-

panies, is likely to hold a meeting within the next couple of weeks to take stock of the situation.

Abhishek Khaitan, president, Radico Khaitan Limited, said it would not make economic sense to concentrate on developing an import portfolio immediately. Radico Khaitan has a joint venture with Whyte & McKay and had drawn up plans for expanding its import portfolio.

KARNATAKA GOVERNMENT TO SPEND RS. 160 CR. TO FEED DAIRY INDUSTRY

To promote the dairy industry the Karnakata government has decided to spend Rs. 160 cr. with the aim to improve the quality of production processing and packaging to reach international standard. Out of the Rs. 160 cr. Rs. 20 will be spent on setting modern "Semen bank" and the balance amount of Rs. 140 crore would be used to run a "pilot project" for the eradication of the dreaded "foot and mouth" and also "blue tongue" disease prevalent among cattle he added. Reiterating the need to run a national programme a combat the above two disease, the programme could be run on the lines of the "National Polio Programme."

The state is also planning to set up modern veterinary laboratories, one in each of the 27 districts of the state. Currently the state already boasts of eight such laboratories.

CAN MILK KEEP CANCER AT BAY

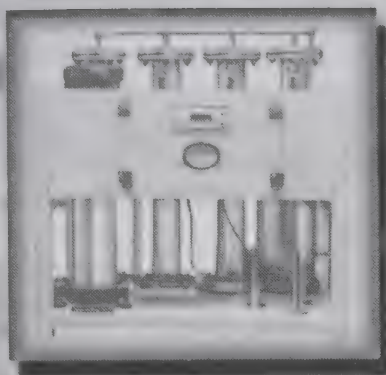
Milk is good for bones is a well known fact. But now the largest dairies in Finland. Valio Oyj is carrying out research by which milk will be able to keep cancer at bay. Valio Oyj has a stable of milk products ranging from low-lactose food and drink to milk which can lower blood-pressure, is planning more dairy products which can improve health and prevent disease.

Key to its success will be the company's unique experience in the research of milk and its ingredients, large research and development staff by dairy industry standards focused on specific areas, and its own arsenal of live lactic bacteria.

Probiotics are live lactic acid bacteria which have been found in clinical studies to travel through the digestive system and cure stomach problems while promoting beneficial bacteria.



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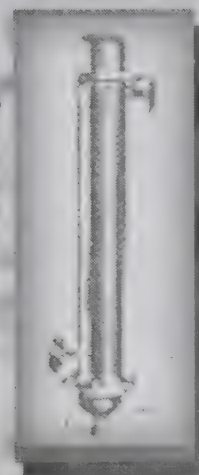
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FOOD LABELS TO HAVE MORE INFORMATION

Labels of packed and bottled food will henceforth contain details of the manufacturer, manufacturing unit and the importer. This follows the government's amendment to the Prevention of food Adulteration (PFA) Act and Rules.

At present, labels contain only the address of the registered office of the manufacturer. However, this does not provide adequate information to consumers or the authorities responsible for food safety. Therefore, the name and complete address of the manufacturer and his unit and that of the packing/bottling unit (in case this is done separately), will have to be indicated on the label.

Similarly, the name along with address of the importer is also needed on the label of imported foods. And, if the imported food is packed or bottled in India, the country of origin of the food article and the name and complete address of the importer and the premises of the packing or bottling in India, should also be mentioned.

These additional requirements were found necessary to facilitate identification of the source of the problem when any issue concerning food safety needs to be addressed or monitored.

DEADLINE FOR MANDATORY BARCODING EXTENDED

Bowing to pressure from a section of exporters, the government has extended the earlier deadline of December 1, 2000 for mandatory barcoding of goods exported from the country to April 1, 2001.

"In view of various representations received, the issue has been re-examined. Keeping in view the difficulties faced by trade and industry, it has been decided to postpone the date of implementation," said a notification issued by the Department of Commerce.

The department had, on September 1, issued a notification making the implementation of barcoding – using international symbologies / international numbering standard – mandatory with effect from December 1, in respect of exports of all finished and packaged items for retail sale.

The exporting community has had differing views on the mandatory implementation of barcoding. While one sec-

tion demanded that a "reasonable extension" be accorded, others felt that exporters should be given the option to decide whether barcoding should be adopted.

MAGNETS MAINTAIN PRODUCT PURITY

In an effort to maintain extremely high levels of product purity, McIlhenny Company, manufacturer of Tabasco, uses strategically placed magnets to ensure that ferrous particles, or tramp metal, do not contaminate their famous hot pepper sauce.

McIlhenny Company has been making Tabasco pepper sauce to the same basic specifications since the formula was patented in 1870.

Tabasco's manufacturing process begins with a special variety of red Capsicum peppers which are carefully selected when ripe and crushed immediately after harvest. Mixed with select Avery Island salt, the mixture is aged in white oak barrels for three years.

When this secret mixture, called "mash," is done fermenting, the pepper seeds, skin and fine pulp are strained by pumping the mash through mills with screens inside. In one particular instance, the engineers at Tabasco were testing a new mill that had thinner and finer screens than their existing mill. While pumping the mash through, small metal particles (a screw) broke the screens – causing unexpected and unnecessary delays in processing.

When a screen breaks in the mill, tearing down the mills and repairing the screen is a time consuming task. After researching multiple options for tramp metal removal, the engineers decided to install Rare Earth magnetic traps from Eriez Magnetics. Recently, increases in the strength of permanent magnets have been extraordinary, and the advent of Rare Earth permanent magnets has allowed the design of high-intensity magnetic circuits. Magnetic circuits designed with Rare Earth magnets now generate a magnetic force much greater than the force generated by conventional ferrite magnets used only a few years ago. Applications for Rare Earth material range from removing small ferrous particles from liquid streams and powders to purifying most processed products.

McIlhenny installed a Rare Earth Magnetic Trap because of its constant powerful permanent magnetic circuit designed to attract and remove iron contamination from liquid substances. These traps contain a group of magnetic tubes arranged to cause the material flow to impinge against the tubes and filter through the magnetic field. The trap then holds on to the ferrous material until an operator removes the contaminant – preventing pumps from jamming and ensuring product purity.

Eriez' Rare Earth magnets have a higher magnetic strength than conventional ferrite or ceramic magnets. This means, the magnets can reach out and attract weakly magnetic or very fine iron contaminants and hold them so tightly that wash-off by product flow is virtually eliminated.

When purchasing any food product from an outside vendor, tramp metal can enter in many ways – from wear and tear on grinding machines to the tanker that transported the mash. "We have placed magnetic traps in the pipe between the tanker and the barrels," says Patrick Castille, Automation Specialist at McIlhenny Company. "This placement removes any metal contamination in the mash before it enters the plant."

The next magnetic traps are placed directly after the mill. "They have been in place for about one year," says Castille. "Our mash ferments in oak barrels for three years. Therefore, there is still the possibility of metal contamination in the barrels that were processed prior to the installation of the magnetic traps."

Finally, there are magnetic traps placed directly before bottling, to ensure that Tabasco Sauce maintains a high level of product purity and quality. Since installing the magnetic traps, the rubber diaphragm pumps which used to last six months, are lasting more than one year.

The trap accomplishes several goals due to its strategic placement at the beginning of the process. This location allows the magnetic trap to:

- ensure product purity by removing any ferrous materials that may contaminate the product;
- protect pumps, screens and other downstream equipment from expensive and harmful tramp metal damage by removing ferrous contamination;
- eliminate downtime due to maintenance on downstream equipment.

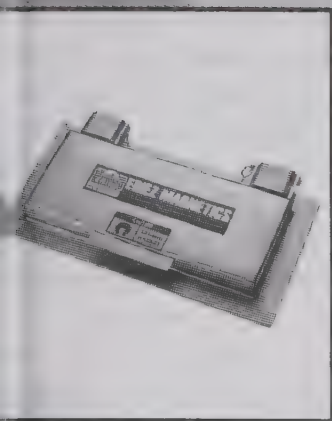
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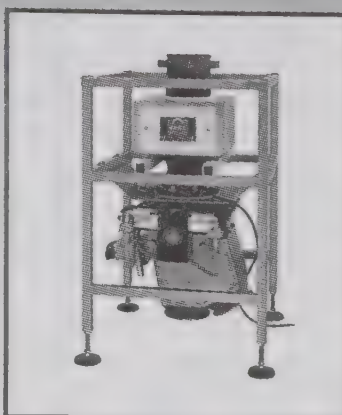
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Metal Detectors & Vibratory Feeders
for the
Food Processing Industry



◀ Plate Magnet

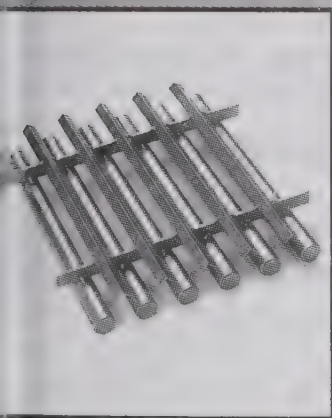
Protect against contamination in processing lines. Six magnetic strengths, including Super Strength Erium® 3000. Install in chutes, ducts, feed tables and over conveyor belts. Sizes from 4 to 72 inches (102 to 1828 mm). Available in stainless steel and sanitary construction, with tapered steps and removable face plates.



◀ E-Z Tec®

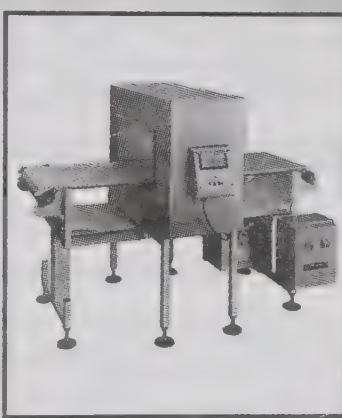
Vertical Reject System

The Vertical Aperture E-Z Tec is the heart of Eriez Vertical Reject System. Free falling materials such as powders, granules, flakes, and pellets travel in a chute or pipe through the detector's vertical aperture to help ensure metal-free product.



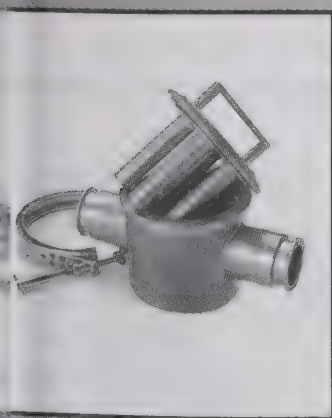
◀ Grate Magnet

Extract small and fine iron when installed in steep-sloped, odd and irregular-shaped hoppers, vertical closed chutes and ducts. Available with Super Strength Rare Earth Elements (developing intensity over 11,000 gauss) in all models, including drawer and wing-type grates, grates in housing (both manual and self-cleaning), and ROTA grates. Also in sanitary construction.



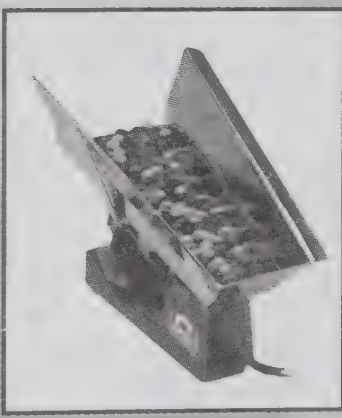
◀ E-Z Tec® Metal Detector

Extremely sensitive metal detector detects small tramp metal in wet and dry products, protecting purity for food and dairy, chemical, cosmetic and pharmaceutical firms. E-Z Tec Metal Detectors are available with complete conveyor systems, including marker devices, alarms and reject mechanisms. Stainless steel construction is available for food, chemical, pharmaceutical and other applications requiring strict product integrity.



◀ Ferrous Trap

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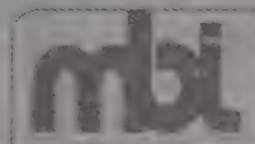
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EXPORT HIGHLIGHTS

SUGAR

India exported 150,000 tonnes of sugar to Pakistan in September-December 2000, and volumes may rise to 600,000 tonnes, for 2001. Currently, the sugar is transported through trains, but very soon it will be delivered by shipments to Pakistan. According to dealers, trains carrying about 2,000 tonnes each were being moved to Pakistan, which has an import demand of one million tonnes due to lower crop output. India began exporting sugar to Pakistan in an attempt to cut a sugar stockpile of nearly 10 million tonnes. The industry has been under pressure to trim stocks ahead of another expected bumper crop. The country's sugar output hit a record 18.2 mt. in 1999-2000 compared to 15.44 mt. a year earlier.

Sugar exports from India were expected to grow within a couple of months with fresh demand likely from Indonesia and Russia. Demand in Indonesia, South East Asia's largest sugar importer is expected to surge in the coming months. Russia the world's largest sugar buyer, is expected to import 3.65 mt. in 2001.

The Indian Sugar and General Industry Export Import Corporation Ltd. (ISGIEC), a private body that exports sugar on behalf of the industry, sold 14 cargoes of 12,500 tonnes each in August last year. But quantities shipped have been lower than expected due to a fall in the global prices.

On the other side, Pakistan sugar industry has urged the Government to raise the import duty on the commodity to 40 per cent from 15 per cent to restrict imports.

CARDAMOM

Due to the increasing demand of cardamom from the Middle Eastern nations, exports touched 675 tonnes during April-December 2000 crop season compared to last year's 550 tonne during the whole crop year.

Officials in the state-run Spices Board say that if this trend continues,

the total exports for the year 2000-01 could easily touch 750 tonne.

The rise in exports is mainly due to the increasing demand from Saudi Arabia and the other Middle Eastern countries. Due to low production of quality cardamom from Guatemala - the major player in the international cardamom market, there has been a shift in the procurement in favour of India.

Guatemala's production is estimated at 12,000 tonne and this amount is expected to fall further. This uncertainty has affected the price and supply of cardamom in the international market and made it possible for Indian exporters to enter the international area. Even the direct sales in the domestic market has increased to 2,500 tonne as against last year's 1,600 tonne. Currently, cardamom production in the country, stands at 14,000 tonne as against last year's 9,290 tonne.

EDIBLE OIL

The oilseeds and edible oil industry has recommended raising the import duty on edible oils to the maximum permissible limit under the WTO to stop unhindered imports of edible oils and protect the interests of the farmers.

In the fiscal year ending 31st March 2001, imports of palmolen and crude palm oil would be very high, and imports of February and March will total to nearly 1 million tonne i.e. CIF value will be nearly Rs. 1,300-1,500 crore. Edible oil imports in the country are more than Rs. 70,000 crore per annum.

Recently the government had hiked the import duty on all edible oils by upto 30 per cent to check the huge inflow of oils such as RBD palmolen, crude palm oil, soybean and groundnut oils into the country.

SOYABEAN

Out of a total production of 3.7 million tonne last year, Indian had exported about 2.4 million tonne of soybean meal to various European

countries. The export target of soybean meal during the current year 2000-2001 (October-September) is also the same as last year's.

However, soyameal being a very price sensitive commodity and in case the Indian prices remain higher, then exports from the country could be on a stricky wicket. The recent ban on bone meal for animal feed by various European nations has generated additional demand for soyabean meal worldwide.

"Oil World" has indicated that the demand for soyabean meal would go up by 6.8 million tonne this year due to this reason.

On the recent shift by countries such as Japan and Vietnam toward purchase of soyameal from United States, said O.P. Goel, chairman of Soyabean Processors Association of India (SOPA), around 60 per cent of the crop has already been marketed. Now, the remaining 2.3 million tonne to be marketed in the next 8 months.

"This means that on an average more than 2,40,000 tonne of meal has to be sold by the Indian processors. Assuming that 80,000-90,000 tonne would go towards feeding the Indian market, there is hardly 150,000 tonne for export which can be marketed without much problem," he added.

SEAFOOD

The Seafood sector is likely to end the year with a record export performance. In the first nine months of the current year, export stood at Rs. 5,000 crore, compared to Rs. 5,117 crore for the whole of last year. On a high note, representatives of the seafood export industry say, the budget should remove all the hurdles and restrictions the way of maximising export earnings.

During the April to December period, exports increased by 32.75 per cent in quantity terms and by 34.26 per cent in rupee terms. The export value added items is also increasing. Much of the increase has come from the export of cultured shrimps from exporters based in Andhra Pradesh.

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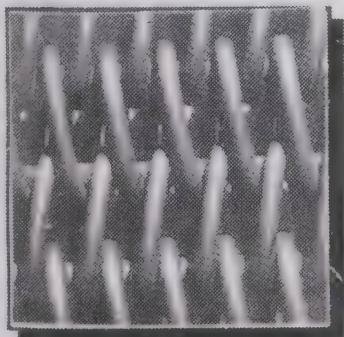
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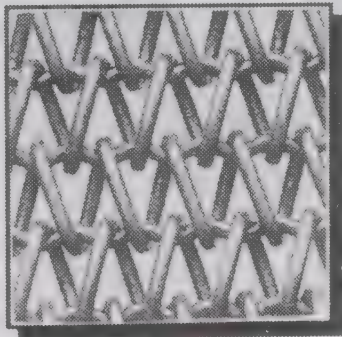
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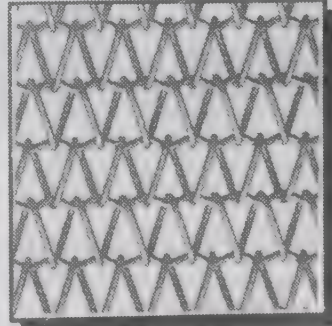
T-19

24 coils of 10 gauge per foot width, 19 crimped crossmembers of 10 gauge per foot length.



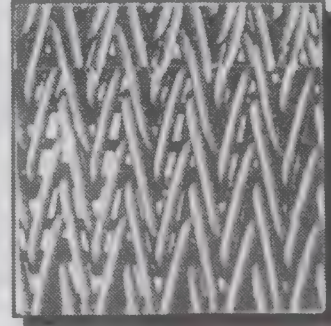
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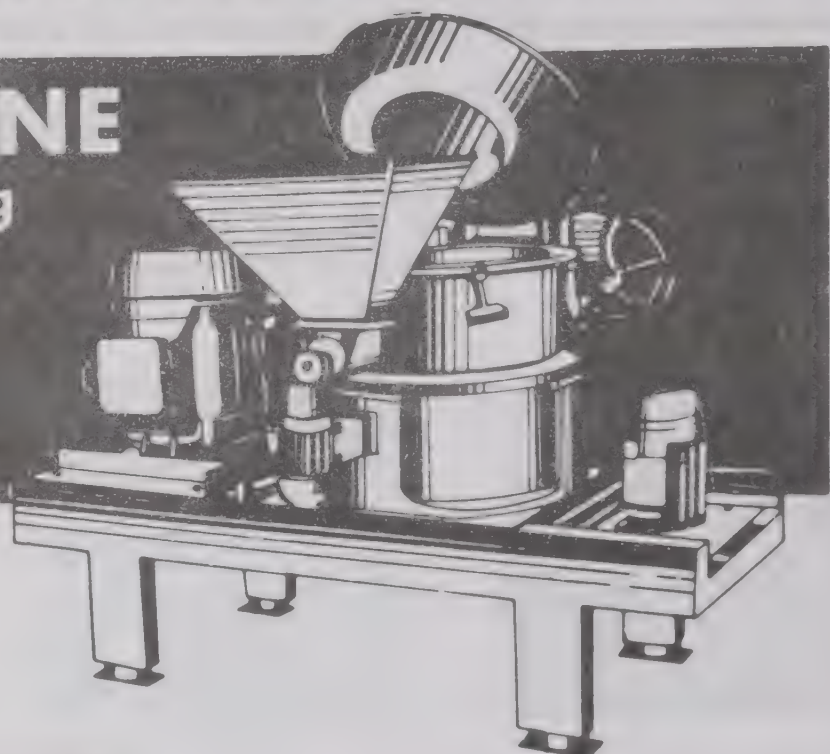
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Trade Fairs offer a golden opportunity to exchange technology, view points, formulate strategies and enter into profitable business partnership with manufacturers, traders, exporters, packaging designers and all those related to food and beverage industry.

Trade Fairs are always significantly important for marketing of any product or services. It is the only medium which offers an intensive and face to face interaction between buyers, seller and the product.

For successful business, proper planning is essential to get involved in Trade Fairs. Companies have to make right decision before participating in any trade fair. As India emerges as a super power in Asia, it has become an important stopover for international industry at global brand events that are spread across the globe.

Home to more than 900 million people, India is the second largest producer of fruits, vegetables, and the largest milk supplier in the world. It offers an attractive and viable option for investors wanting to tap this enormous market.

India's success in the Green, White and Blue Revolution has been recognised the world over. The success in feeding the vast population of India and also generating export surpluses can be mainly attributed to the efforts of the farmers and the scientific achievements in agriculture and its allied food processing and dairy technology sectors. During the year 1999-2000, India's agricultural output was 199.06 million tonnes (anticipated) while milk production was 74.5 million tonnes (anticipated) in 1998-99.

The hospitality and food processing industry have been granted priority status by the Government of India with the food processing industry witnessing over 20% growth per annum. The hospitality industry has also registered brisk growth in the past few years as both domestic and international tourism have risen substantially since 1992.

The Government of India is keen to further upgrade domestic technology and enhance its international competitiveness. To achieve this goal, it is continuously liberalising the foreign trade and investment policy framework. Procedures have been simplified. Licensing in most sectors has been eliminated. Foreign Technology Agreements within specified parameters are now accorded automatic clearance.

In this context, the 'AAHAR' exhibition (formerly known as 'Ahara'), by mirroring the technological developments in the food processing industry and its allied sectors in India and abroad, has been acting as a worthy catalyst in the modernisation process while imparting the desired fillip to the export efforts. Significantly, the fair has also been an appropriate platform for initiation of joint venture agreements and technology transfer processes covering a broad spectrum of the industry.

India Trade Promotion Organisation is organising the **AAHAR International Exhibition for Food, Food Processing and related Equipment, Hotel and Restaurant Equipment and Supplies**, 16th in the series at Pragati Maidan, New Delhi from March 17 to 21, 2001. The fair is being organised by ITPO with the support of the Department of Food Processing Industries, Ministry of Agriculture Government of India, Agricultural and Processed Food Products Export Development Authority, Association of Resource Companies for the Hospitality Industry (ARCHI), New Delhi, Confederation of India Food Trade & Industry (CIFTI), New Delhi, All India Food Preservers Association, New Delhi. The exposition has been recognised as Asia's leading event on food technology.

DISPLAY PROFILE AT AAHAR 2001:

- (i) **Food Products**
All kinds of foods, processed foods, except alcoholic beverages.
- (ii) **Food Processing, Packaging, Mill Machinery and Equipment**
All machinery related to food processing and packaging of food products, milling machinery, poultry, farming equipment and supplies.
- (iii) **Dairy & Confectionery equipment.**
- (iv) **Air conditioning, refrigeration & cold storage system.**
- (v) **Air & water pollution control equipment & accessories**
- (vi) **Hotel, kitchen equipment & tableware**
- (vii) **Health & fitness equipment**
- (viii) **Consultancy services and miscellaneous products related to food industry and hospitality supplies.**



As we go to press, the following companies have booked space in AAHAR 2001

A.C. Humidification Engineers (P) Ltd.	Klas Products Pvt. Ltd.	Relief India
Anand Refrigeration Co. Pvt. Ltd.	Kundan Power Products Pvt. Ltd.	Rite Equipment Pvt. Ltd.
American Soybean Association	Master Style Uniform Fashion	Satellite Plastic Industries
Brimco Engineering Works	Metro Equipment Company	Saurabh Engineers
CS Aerotherm	Mittal International (India) Pvt. Ltd.	Schaaf Asia (P) Ltd.
Cas Weighing India Pvt. Ltd.	Mohan Fibre Products Limited	Shivam Industries
Constellation Projects	MSC Co. Ltd.	Sidhant Overseas
Cosyco International	Multi Creations Pvt. Ltd.	Sigma Sales Service
Dairy Den Limited	Navarang The Flexible Packaging	Soft Sensations
Dorcas Market Makers Ltd.	New Indo International	STEC Stainless Steel Pvt. Ltd.
Engineers India Research Institute	Om Oil & Flour Mills Ltd.	Subhash Chander & Bros.
Gee Kay Sales Corporation	Pachranga Syndicate (P) Ltd.	Surya Food & Agro Ltd.
Gemni Engineers	Prokop Eltex (India) Pvt. Ltd.	Technocrats
Guidex Business Systems	PRS Technologies Pvt. Ltd.	Thakar Equipment Company
Hotels Equipments Merchants	R & D Engineers	The Butler Hotel Super Market
Hotel & Food Service Consultants Pvt. Ltd.	Raj Decorates Pvt. Ltd.	Verpaco India Pvt. Ltd.
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PAKEX 2001

Venue: Birmingham, England

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Reed Exhibitors have launched, www.pakexco.uk the most advanced, interactive website in the global packaging exhibitions field for simplifying the visits of international visitors and potential buyers.

For details, please contact:

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FOOD EXPO 2001

Venue: Bangalore

Date: 13-17 April, 2001

India, the second largest food producer in the world, has the potential to become the largest producer in the world. There has been a steady growth in the food processing sector during the last decade, its full potentiality is yet to be exploited for it to become one of the key players in the domestic and international markets.

Marketing of foods and processed food products has assured paramount importance in food business. With this in view, Centre for Processed Foods have associated with M/s. Enterprising Exhibitions in promoting marketing opportunities and boost market related activities in food business by organising **Food Expo-2001**.

Display Category: Food Products including Processed Foods, Sea Foods, Spices, Cereals, Edible Oils, Pickles, Chutneys, Cashewnuts/Kernels * Beverages (excluding alcoholic drinks) - Mineral water, Soft Drinks * Frozen Foods & Herbal Products * Bakery, Confectionery and Dairy Products * Fruits & Fruit juices, Raw Materials, Ingredients & Additives * Food Processing, Packing and Coding Machinery * Milling Machinery & Equipment * Dairy, Bakery and Confectionery Equipment and Machinery * Cold Storage, Air Conditioning and Refrigeration Equipment * Air and Water Pollution Control Equipment * Hotel and Kitchen Equipment, Table-ware * Health and Fitness equipment * Associations, Research Institutes & Export Promotion Councils * Service Providers/Consultancy Services * Miscellaneous products related to food industry.

For more details contact:

Enterprising Exhibitions, HRI Bldg., 8th Main, 9th Cross Shivanagar, Rajajinagar, Bangalore 560 010, Karnataka. Tel: 3357758, Fax: 080-3324338, Email: foodexpo2001@yahoo.com

BANGALORE BIO.COM 2001

Venue: Bangalore

Date: 15-17 April, 2001

BIO.COM 2001 is organized by the Vision Group on Biotechnology appointed by the Government of Karnataka and co-organized and produced by Trade Fairs & Conferences International (TFCI), a leader in organizing niche technology trade shows and conferences. Together, they bring a world of opportunity at the epicenter of all biotech activity.

Bangalore BIO.COM 2001 Conference comprises of distinguished speakers from various segments of the biotechnology industry covering genomics, bioinformatics, gene therapy, cell therapy, cancer biology, novel therapeutics, neurosciences, proteomics, intellectual property, regulatory issues, public policy, marketing, mergers and acquisitions, ethics, public relations and human resources.

This event, held at Palace Grounds is an opportunity to showcase and promote the latest biotechnology products, technologies, equipment and services to the Indian Biotechnology Industry and its support organizations across the globe.

For more details contact:

Trade Fairs & Conferences International B-309, Hind Saurashtra Industrial Estate, M.V. Road, Andheri (East) Mumbai 400 059. Tel: 91-22-85940578/9, Fax: 91-22-8594060. Email: tfci@tfci.com

GLOBAL FOOD TECH 2001 AND GLOBAL EXPO 2001

Venue: Goregaon, Mumbai

Date: 19-23 April, 2001

The Global Food Tech 2001 and Global Expo 2001 together aim to bring product and technology from all over

world under one roof. This mega event will make available the different sources of information of the latest development of technology in the field of Food Technology, Refrigeration, office automation, Electronics, consumer goods and Consumerables, Packing and Marketing techniques and also reveal India's development in various fields.

Global Food Tech 2001 is an event dedicated to the latest product innovations in the food and drink industry, and will be Mumbai's event of international repute with more than 300 exhibitors from entire food and beverages, hotel technology, dairy industry. Food Tech 2001 is designed to provide a unique marketing opportunity.

Exhibitor Profile: • Processed Foods • Dairy products • Beverages • Breweries • Wine • Fresh Frozen Foods • Ice Cream and desserts • Seafood • Confectionery • Spices • Bakery products • Canned foods • Food processing Machinery and Equipment • Packing Material • Dairy Machinery • Equipment • Canteen Equipment • Beverage / Soft drinks • Printing • Labelling / Marking • Wrapping Machinery • Canning Technology • Food ingredients / Additives • Storage systems • Refrigeration / Freezing Equipments • Bottling Technology • Instrumentation, Testing • Quality control • Liquid handling • Waste / Water treatment • Measurement and Weighing • Process control Technology • Agricultural supplies.

Global Food Tech 2001 conference is run concurrently has been drafted with the intent to provide valuable insight into the development in the food industry, study the past market trend, analyse

and forecast accurately future trends, and make available critical information on technologies strategies for successful implementation of plans.

For details, please contact:

Global Foundation, 12/260 Samudradarshan Co-operative Society, D.N. Nagar, Andheri (W), Mumbai 400 053. Tel: 6235154, Tel/Fax: 623 5153, Email: globalf@hotmail.com / eglobalexpo@hotmail.com, Website: eglobalfoundation.org

VICTAM EUROPE 2001

**Venue: Utrecht, The Netherlands
Date: 24-26 April, 2001**

The new millennium will witness for the first time on event that lays emphasis on animal feed and aqua feed. Organised by Hank Van de Bant, Victam Europe 2001 will present a series of conferences on Scientific and Technical know how on new ingredients and applications to ensure efficiency of production, safety & quality of meat, fish, milk and egg products.

The theme of the scientific and technical papers will be "new ingredients and applications to ensure efficiency of production, safety and quality of meat, fish, milk and egg products". Experts will provide guidance and facilitate an exchange of information, ideas and views on the most important issues facing the animal and aquatic feed industries today. It will appeal to all those concerned with feed formulation nutrition, health, feed and food safety, as well as, economic and environmental feed production.

For more details contact:

Victam International BV., P.O.Box:

197, 3860 Ad Nijkerk, The Netherlands. Tel: ++31-0-33 246 4404, Fax: ++31-0-33 246 4706. Email: expo@victam.com Website: www.victam.com

HEIS-2001

**Venue: Hotel Rang Sharda,
Bandra, Mumbai
Date: 14-17 June, 2001**

Organised by Expo Vision Corporation, Hotel Equipment Interior Show, HEIS-2001, will showcase the best in Hotel and Kitchen Equipment, Bakery Equipment, Tabletop-Cutlery, Crockery, Housekeeping-Linen, Maintenance Equipment, Food & Beverages + packaging, Airconditioning and Refrigeration, Electrical-Lighting, Heaters, Sound Equipment, Solar Equipment, Boilers, Interiors, Exteriors, Furniture-Indoor & Garden, Tiles, Sanitaryware, Marbles, Building Materials anything and everything for Hospitality Industry.

For more details contact:

Expo Vision Corporation (India), Arun Mewawalla, 38 Hanuman Bldg., 308 Perin Nariman Point St., Fort, Mumbai 400001. Tel: 2665342/2664992, 2664224, Fax: 022-2678082, Email: expovision@yahoo.com

SEAFOOD CHINA EXPO 2001

**Venue: Kowloon, China
Date: 14-17 June, 2001**

Organised by Dalian Municipal People's Government, China Society of Fisheries, and Business and Industrial Trade Fairs Ltd. and co-organised by Dalian Bureau of Aquatic Products of China, Dalian Xinghai Convention & Exhibition Centre, and Business &

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Nellore (Dist.) A.P.

Phones: 08624 - 51328, 51428

Fax: 08624 - 52958

Email: scitrus@yahoo.com

Website: www.ctrus.com

Industrial Trade Fairs Ltd., Seafood China Expo promises to be very impressive and effective in paving the business road to China.

The Chinese government's enthusiastic encouragement on marine environmental protection and aquaculture technological development gives reliable guarantee aquaculture development. With the keen participation of China Society of Fisheries, Seafood China Expo 2001 offers the best path for newcomers to explore the China seafood market and for the existing businessmen to expand their business scale.

Seafood China Expo opens up the gateway for seafood industries to source new seafood products, find new market, and meet international suppliers and buyers in the potential lucrative China seafood market.

Exhibitor Profile: Seafood, Seafood Processing, Packaging, Storage Equipments, Aquaculture Equipment and Commercial Fishing Equipment.

For more details contact:

Business & Industrial Trade Fairs Ltd., Unit 1223, 12/F, HITEC, 1 Trademart Drive, Kowloon Bay, Hong Kong. Tel: 852-2865-2633, Fax: 852-2866-1770, 2866-2076, Email: enquiry@bitf.com.hk

ASIAN BREW & BEVERAGE 2001
Venue: Singapore
Date: 20-22 June, 2001

The 2nd International Brew & Beverage Technology & Equipment exhibition is a dedicated event set in tune with regional market trends.

The exhibition will feature various kinds of production and processing equipment, from beer and beverages, catering equipment, machinery and installations, operating equipment, measurement and control technology, energy management, disinfection equipment, laboratory equipment, process materials, industrial safety and recycling facilities, to labelling and packaging materials, raw materials, etc. Concurrently held, will be a series of seminars which cover key brewing and beverage technologies for the robust development in the Asia-Pacific region. Asia remains the powerhouse of beer and beverage industry.

Asian Brew & Beverage 2001 is anticipated to draw more than 10,000 industry buyers. Among them will include producers of alcoholic and non-alcoholic drinks, vintners, distillers, importers/exporters, planning and engineering consultants, training officers, wholesalers, as well as managers of

MACFRUT 2001

Venue: Cesena, Italy

Date: 03-06 May, 2001

Macfrut 2001 is the 18th International Exhibition for Equipment, Technology & Services for the Production, Processing and Marketing and Transport for Fruits & Vegetable.

The Italian Trade Commission in Mumbai is a Government agency which provides information and assistance to Italian and Indian firms interested in bilateral trade. They organize seminars, workshops, delegation to trade fairs, one-to-one business meets, factory visits and other promotional events.

Alongwith the organiser of "MACFRUT2001", they are currently promoting a semi-sponsored delegation of Indian businessmen interested to visit this exhibition to be held from 03 to 06 May, 2001, in Casena, Italy. This trade show will host over 700 carefully selected, Italian & international companies, to present latest innovation in the sectors of plants & systems, technology & services for the production, storing, commercialization and trans-

hotels and restaurants, etc.

For more details contact:

Business & Industrial Trade Fairs Ltd., Unit 1223, 12/F, HITEC, 1 Trademart Drive, Kowloon Bay, Hong Kong. Tel: 852-2865-2633, Fax: 852-2866-1770, 2865-5513, Email: promotion@bitf.com.hk

2001 TEA & COFFEE WORLD CUP
Venue: Amsterdam, The Netherlands
Date: 26-28 June, 2001

Organised by Lockwood Publications and sponsored by Tea & Coffee Trade Journal and Tea & Coffee Asia, the 2001 Tea & Coffee World Cup is the only exhibition/symposium in Europe that offers one-stop shopping for everything relating to coffee and tea.

A global trade show for coffee and tea products equipment and services, an innovative forum presenting the most up to date information relating to tea & coffee, 2001 Tea & Coffee World Cup will have over 250 exhibitors from across the world. About 4,500 buyers are expected at the show.

For more details contact:

Show Manager, Frank Schuetze. Tel: (49) (30) 645-7212, Fax: (49) (30) 640-9135, Email: fbsch@t-online.de

port of fruits and vegetables.

All the participants of the delegation will be offered:

- > Air travel at discounted rates
- > Free hotel accommodation for 4 nights in a 4 star hotel
- > Free airport hotel/airport group transfers
- > Free transfer from hotel to the fair grounds and back to the hotel
- > Complimentary entry tickets and assistance to the delegation during the fair
- > Complimentary lunch
- > Assistance for acquiring visa

The trade mission will be accompanied by senior trade analyst — Mr. Trevor D'Lima, specialized in the sector who will be in position to provide assistance in arranging meetings, etc. The package tour is being organized by a local travel agency.

For more details contact:

Italian Trade Commission, 115 Maker Chamber VI, 11th Flr, Nariman Point, Mumbai 400 021. Tel: 022-282 1125/1214/ 2815654/ 5655, Fax: 022 282 1085, Website: www.macfrut.com Email: icemb@vsnl.com

AGRI INTEX 2001

Venue: Coimbatore, Tamil Nadu
Date: 1-5 August, 2001

Organised by Tamil Nadu Agricultural University in collaboration with Coimbatore District Small Industries Association (CODISSIA) the biggest Association of its kind in the country enjoying support of over 4000 industries international agricultural exhibition. Agri Intex 2001 aims to highlight development, growth and opportunities in modern agriculture and all the related activities of rural, national and global nature.

AGRI INTEX 2001 will be the meeting point for the lead players in the respective fields to launch and market their products, technologies, expertise and services through interaction with large variety of domestic and international participants and visitors.

Coimbatore finds a prominent place in the Industrial & agricultural, progressive engineering, modern textile professional education & research institutions.

For more details contact:

Agri Intex 2001, CODISSIA TRADE FAIR COMPLEX G.V. Fair Ground, Avinashi Road, Coimbatore 64101. Tel: 91-422-593505, 593507, Fax: 91-422-593506 Email: cointec@vsnl.com



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GLOBAL FOOD TECH 2001

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CONCURRENT EVENTS

SEMINAR - IN ASSOCIATION WITH CONFEDERATION OF INDIAN FOOD TRADE AND INDUSTRY

THE FOOD PROCESSING WING OF (FICCI)

GLOBAL FOOD FESTIVAL - VARIETY OF INTERNATIONAL CUISINES

SUPPORTED BY



CIFTI



CIFTI - CONFEDERATION OF INDIAN FOOD TRADE AND INDUSTRY

CFTRI - CENTRAL FOOD TECHNOLOGICAL RESEARCH INSTITUTED

UN-APCT - UNITED NATIONS ASIAN AND PACIFIC CENTRE FOR TRANSFER OF TECHNOLOGY

SISI - SMALL INDUSTRIES SERVICE INSTITUTE

NCTI - NATIONAL CENTRE FOR TRADE INFORMATION

FBMI - FEDERATION OF BISCUIT MANUFACTURES OF INDIA



DEPARTMENT OF PROCESSED FOOD INDUSTRY

MINISTRY OF AGRICULTURE

GOVERNMENT OF MAHARASHTRA

AIPPA ALL INDIA FOOD PRESERVERS' ASSOCIATION

IIP - INDIAN INSTITUTE OF PACKAGING

AIBMA ALL INDIA BREAD MANUFACTURES ASSOCIATION

FOR BOOKING CONTACT

TEL :- 91-22-6235153 / 54 Email globalf@hotmail.com
FOR ONLINE REGISTRATION-www.eglobalfoundation.org

ORGANISER



GLOBAL FOUNDATION

12/260 Samudradarshan Co-op. Society,
D.N. Nager, Andheri (west),
Mumbai:- 400053 .India.
TeleFax:- 6235153. Tel:- 6235154

Venue

19 - 23 April 2001
Bombay Exhibition Center
Near Western Express Highway
Goregaon (East), Mumbai (India)

MARKETING ASSOCIATES

GLOBAL TRADE FAIRS AND EXPOSITIONS

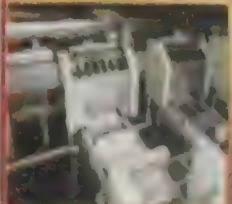
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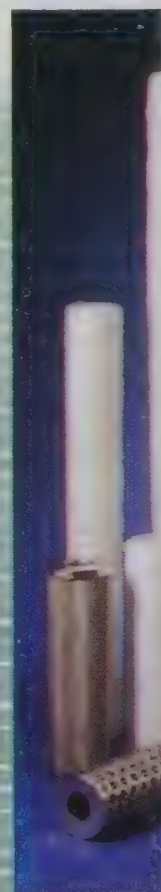


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Siddharth Ads

PRODUCT REVIEWS

VEGETABLES/FRUIT DEHYDRATORS

Shirsat Electronics are pleased to introduce Dehydrators for vegetables and Fruits.

These run on Gas or Diesel and are very economical to run. Capacities available are from 150kg/hr. to 1000 kgs/hr. of dried product. The material of construction is Food grade stainless steel. The machine is simple to use and easy to maintain. The machine has minimum moving parts, are very compact and floor space required is very less. Conversion price for the food item is very low and the machines are extremely cost effective.

For further details, contact:

Shirsat Electronics

133, Dewan Industrial Estate No.6
Navghar, Vasai Road East
Dist. Thane 401210
Tel: 91-250-338946
Fax: 91-250-340793
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WASTE WATER TREATMENT

Aqua Filsep Inc. committed to Water and Waste Water Treatment, have considerable experience in providing to the industry, solutions to water and waste water treatment. Consequently, the company has developed expertise in process equipment, control design, and construction of custom-engineered systems for a wide range of applications, with active support of their associates, Cosmonics Corporation, USA and Aquafine Inc., USA.

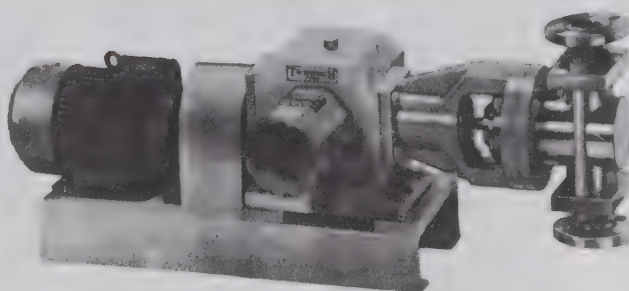
The various products that **Aqua Filsep** offers are * Water and Waste Water Treatment Plants * Reverse Osmosis Plants, * Demineralisation Plants * Water Softening Plants * Sand Filters and Activated Charcoal Filters * Chemical Dosing Units * Mineral Water Plants * Swimming Pool Water Purification Systems * Waste Water/Effluent Treatment Plants * Clarifiers, flocculators, Clarifiers, Aerators. Water and

SOYA LECITHIN

Soyachem Industries started production in 1989, strictly controlled by experienced engineers.

The company manufactures and supplies Soya Lecithin, Sugar Mill Chemicals, Protein Concentrates, Soya Products and Food Products, Soya Lecithin is used mainly in biscuits, chocolates,

METERING / DOSING PUMPS



Technomech Metering / Dosing Pumps are precision positive displacement plunger type pumps for controlled and high accuracy feeding of various liquids / chemicals under different discharge / pressure conditions. An integral worm reduction is used with eccentric and connecting rod to convert rotary motion into a reciprocating motion. The crank can be adjusted by means of a micrometer which changes the eccentricity of crank and consequently the stroke length. The pump output is manually adjustable while it is in operation or at rest from 0 to 100% through a micrometer which is calibrated. The drive side mechanism is enclosed and runs in an oil bath. These pumps are supplied with motor coupled together by a flexible coupling and mounted on a common base plate in a ready-to-use condition. Motors can be offered in TEFC weather proof, flame proof, explosion proof versions as per specific requirement. Liquid ends of pump can be offered in CI, SS-304,

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1. Corrosion Inhibitor 2. Scale Inhibitors 3. Oxygen Scavengers 4. pH Boosters 5. Fuel Additives & Combustion Catalysts.

Other Related Products, Spares and Components include: * Membranes, Resins * High Pressure Pumps, Pressure Boosting Systems * Pressure Vessels * Storage tanks for special purpose etc.

The services that the company of-

bread, confectioneries, paints/printing inks, aqua feeds, explosives, textiles etc. Soya Lecithin is an additive, acts as an emulsifier, anti-oxidant, anti-spattering, anti-settling dispersing, wetting agent.

Soya Lecithin is available in grades of food, pharmaceutical and industrial. Soyachem Industries supply Soya Lecithin and other products to various reputed

SS-316, Alloy-20, Polypropylene, Hastalloy B & C, Teflon depending on applications. Different models are available in the range of 2 to 2000 Ltrs./Hr. The pressure can be offered to maximum 200 kg./CM². These pumps are capable of continuous duty and can handle liquids, chemicals either acidic or alkaline with high repetitive accuracy at any single setting. These are suitable for

continuous process plants where feed volume needs to be adjusted often. This can feed viscous polymers with accuracy and can be used with advantage for dosing of flocculants, alum, reagents, urea etc., in water and effluent treatment and in process industries like paper, textile, chemical etc. These pumps can also be used for pumping in fertiliser, petrochemical, sugar, thermal power plants, pharmaceuticals and other industries. In Duplex Models capacity of each pump can be adjusted individually and can offer facility for blending or pumping liquids of dissimilar nature. Optional accessories include Safety Relief Valve, Pulsation Dampner etc.

For further details, contact:

Technomech Pumps

Gala No. 10, Bombay Wire Compound
IP Patel Road, Goregaon (E)
Mumbai 400063
Tel: 8732455
Fax: 022-8734162

services include: After-Sales Services & Annual Service Contract * Modification/ Automisation of existing Water & Waste Water systems etc.

For more details, contact:

Aqua Filsep Inc.

7 Retiwala Indl. Estate
H.A. Palav Marg, Byculla (East)
Mumbai 400 027
Tel: (O) 3719455, Fax: (R) 4465521
Email: filsep@ad1.vsnl.net.in

organizations throughout the country.

For further details, contact:

Soyachem Industries

G-3, Ankit Apartment
31, Vishnupuri
Indore 452 017
Tel: 0731-474117/366039/284779
Email: jdgupta@bom4.vsnl.net.in

CANNING MACHINES

Established by Mr. A.P. Pandeya in 1987 after closure of Metal Box Co., Cantech is a trusted name for fruit and vegetable Canning Machineries. The basic objective of the company at the beginning was to supply spares for the existing base of the Metal Box Seaming equipment used by hundreds of customers in India. Subsequently other Can Seaming Equipment were introduced.

The company has trained, skilled Service Engineers to attend various customers requirements at short notice and claims to have 90-95% of the high quality can seaming equipment business in western India, mainly Maharashtra, Goa, Gujarat, Madhya Pradesh and Karnataka. Cantech supplies and supports the following machines required for food processing and allied industries:

Semi-automatic Seamer with speed of 30-40 cans per minute, Body Reformer, Hand Flanger, Flange Rectifier, Body Bearer, Embossing Press, Testing Equipment.

Cantech Seaming Equipment are also exported to the Middle East and various African countries.

Cantech represents Shin-I Machinery Works Co. Ltd. Taiwan for high speed seamers and Chase Manhattan Inc- Taiwan for world class OTS Cans and easy open ends.

For further details, contact:

Cantech Machines

13, Vora Bhavan
Opp. King Circle Garden
Matunga (C.R.), Mumbai - 400 019
Tel: 409 6086/409 6853
Tel/Fax: 91-22-4096086

CRATES AND CONTAINERS

Prince Multiplast (formerly known as A-1 Plastics) is one of the largest plastics processors in India. They have developed capabilities in manufacturing Injection Moulded Bottle Crates, Material Handling Crates as well as Blow Moulded Packaging Containers.

Prince Multiplast is a ISO 9001 Certified Company by Quality Assurance Services Australia. Some of its customers are Coca Cola, Pepsi and Cadbury for its plastic crates while its blow moulded containers are sold to the likes of Gulf Oil, National Dairy Development Board and Indian Oil Corporation. The company's products are seen virtually in every state of the country.

Continued quality improvement is a way of life at Prince Multiplast from designing development, manufacturing, inspection, testing, production to distribution and customer service. Prince Multiplast has also ensured that product design and manufacturing processes are eco-friendly to avoid wastages.

Prince Crates are injection moulded in high grade plastics. Available in a wide range of design and colours, they are odour-

MULTI-FUNCTION CONTROL/ DISPLAY PRODUCT Systems.



Eurotherm DEL India Limited is a joint venture between Dalal Group and Eurotherm Plc., UK part of Invensys Plc., one of the world's leading automation and controls companies. Eurotherm manufactures a wide range of control, monitoring and data recording systems and products. The company's offerings include Variable Speed Drives and related Power Control products, Temperature and Process Controllers and Indicators, Data Recorders and Acquisition Systems, Process Automation Systems, and Film Sheet and Coating Measurement & Control

less and resistant to acids, alkali solutions in common use and are non-toxic. They can be screen printed and embossed with the customer's name and logo and have excellent stability and stacking capacity. These strong and durable crates are used in variety of industries like Fisheries, Hatcheries, Vanaspati, Edible Oils, Ice Creams, Frozen Desserts, Soft Drinks, Beverages, Breweries, Textiles, Automobiles, Farms (Floriculture, Horticulture or an Orchard). Bakeries and many more.

The company produces a wide range of blow moulded articles from 0.5 ltrs. to 30 ltrs., which enables the company to be a one stop shop for its customers who need different sizes of containers. The various functions consisting of product design, development, manufacturing, testing, storing and supply are done under one roof which enhances the co-ordination and

Eurotherm has introduced an innovative multi-function control and display product called Visual Supervisor, a process controller data logger, set point programmer and interactive touch screen display in one unit. It is capable of performing both continuous and sequential control. It features comprehensive alarm and event management, powerful trending, setpoint programming and local data logging facilities. It can be used either as a stand-alone system, or as a building block within a larger system.

Truly open I/O networks are possible with Visual Supervisor, as it provides support for both PROFIBUS and MODBUS. It can also be connected to Eurotherm's proprietary ALIN local network, allowing both peer-to-peer and system communications. The graphical setpoint programme offers between one and sixteen analogue setpoint profiles, and between one and 32 digital output profiles from a single time base.

Visual Supervisor may be connected to a wide range of process interface I/O modules and other third party devices.

For further details, contact:

Mr. T. Aravamudhan
Eurotherm Del India Limited
152, Developed Plots Estate
Perugudi
Chennai - 600 096
Tel: +91-44-4961129
Fax: +91-44-4961831
Email: info@eurothermdel.com
Website: www.eurothermdel.com

quality and hence, better services for valuable customers. The industries which use the company's containers include Edible Oil, Lubricant Oil, Chemicals, Pharmaceuticals and Household Liquids.

The Computer Aided Designing Centre, well equipped Testing Laboratory, modern manufacturing facilities and a team of skilled, dedicated personnel enables the company to satisfy the customer's needs at all times.

For further details, contact:

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Applications: As a high build protective coat for concrete floors for high abrasion, chemical resistance and where a dust-free & hygienic environment is required. Garages, light industrial factories, hospitals, operation theatres, pharmaceuticals, food or drinks industries, abattoirs, electronics factories, warehouses, workshops & sports centres. For heavy-duty waterproofing in large water reservoirs, spray ponds etc. Available in select colours.

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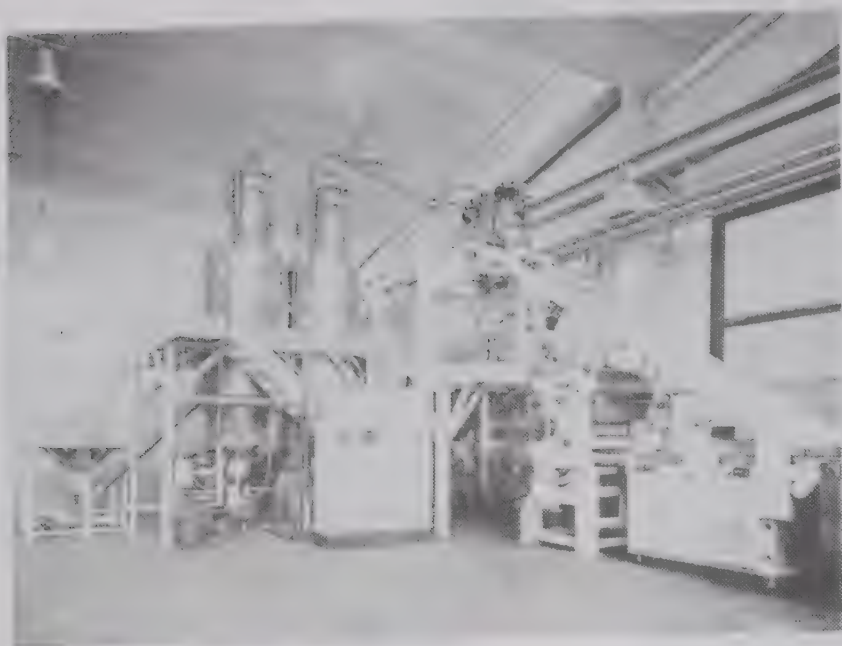
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PELLET SNACKS EXTRUSION



The continuous evolution of pellets has led to successive modifications and adaptations of the original cooking technology separated from the forming. The flat shapes, the double sheet ones, the holed shapes are some of the evolutionary stages of the shape of the snack pellet, together with modifications to the texture and composition of the product. The evolution of technology brings Pavan to propose different types of combinations today to obtain all types of shapes: from those cut on die, with cooking technologies separated from forming and those laminated in double sheet where an extruder-cooker properly equipped directly forms a sheet which is then conditioned, grooved and cut by a rolling forming machine. In this product group obtained from a sheet, the potato based ones occupy a top position. Thanks to a particular type of raw materials they don't require any cooking, so only a forming extruder is used

able to recycle directly and continuously the scraps produced from the oval or round shaped cuttings. The flexibility of the development of new shape and formulation shapes and the long experience in the sector allow the Mapimpianti Division to impose new technological and mechanical choices even in sectors close to pellet snacks like humid fried products, like humid fried products (without drying), precooked flours and breakfast cereals. The semi-manufactured phase then permits very

significant production rationalization: the same product can be manufactured for a week, then stored and then taken out again to be finished as the market demands the product. Analogously, in those countries where it is difficult to obtain suitable packaging materials, the semi-manufactured products can be distributed to peripheral plants which are also equipped, which can see to expanding the quantity of the product which is demanded in the short term, packaging it in packages able to ensure a minimum shelf life.

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Email: foods11@hotmail.com

ALGINATES/XANTHAN GUMS

Kelco's Alginates are derived from *algin*, the polysaccharide extracted from brown sea weeds harvested along the coast of North and South America, New Zealand and Africa. Kelco's processing and manufacturing plants are located in San Diego, California, Girvan and Barcaldine in Scotland. Kelco's Alginates are world class highly standard products. These are refined industrial and gelling grades sodium alginates, refined ammonium, refined potassium and propylene glycols alginates. Kelco also manufacture alginic acids, specialty alginates and dairy stabilizers.

The alginates are available in low, medium and high viscosity grades. They are used as thickeners, gelling agents, water holding agents in food, textile, paper, explosives, ceramics, pharmaceutical and various other industries. They are sold under various trade names such as Manutex, Manugel, Superloids, Kelmar,

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Xanthan Gums are produced by aerobic submerged fermentation and are identical to the polysaccharide formed by the bacterium *xanthomonas campestris*.

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Pollucon Enviro Engineers Pvt. Ltd., is an engineering firm and offers various services such as designing, structural designing, construction, fabrication, erection and commissioning of Water, Waste Water and Air Pollution Control Systems.

Company Set Up: Established in 1995 with initial organization set up of three persons with two clients. Today with a good reputation and skill in the technical aspects its total strength is 35 and with about 15 to 16 clients at a time.

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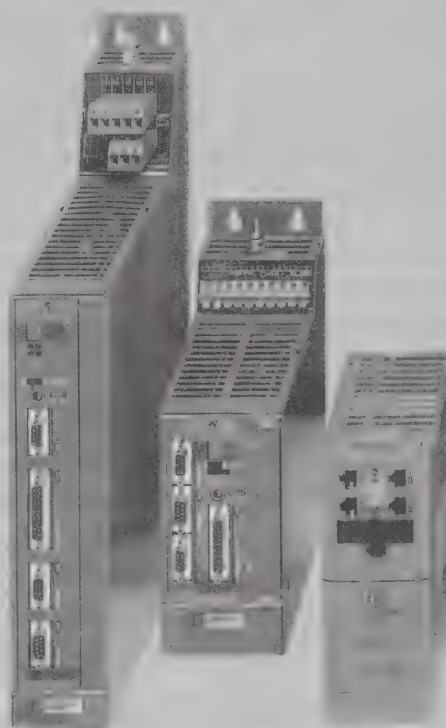


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Silicon Tubing is a synthetic material derived from a combination of Silicon, quartz and sand. Silicon is free of any additives which could be a potential problem in biopharmaceutical processing.

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Other products available from Amesil are * ASTC: Clear Biopharmaceutical grade tubing * ASTP: Clear Tube for Pump applications * ASTR: Braid reinforced platinum cured tubes for high pressure applications * ASTW: Stainless Steel Wire reinforced with polyester braid for extremely high pressure and vacuum applications * Ameprene: A thermoplastic rubber totally synthetic tubing with high chemical resistance * Gaskets: Platinum cured silicon gaskets from 1/4" to 8" * Stopper: Sanitary Stoppers * Reusables SS and fittings.

Amesil Silicon tubings are resistant to moisture, ozone, radiation, weathering and to chemical agents. These Silicon Tubings can be sterilized by Gravity Autoclaves, Flash Autoclaves and Prevacuum High Temp Autoclave as well as sterilized by gamma radiation and ethylene oxide.

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Shah Brothers

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Palton Road, Mumbai 400 001
Tel: 2659700, Telefax: 2611329
Email: shahbros@bom5.vsnl.net.in

ROTARY BOTTLE WASHER

Kothari Pharma, a manufacturer of a wide range of equipments for the pharmaceutical and chemical industries, offer Rotary Bottle Washer, a cost-effective, elegant-looking and highly efficient equipment as per GMP standards. Operating on the Rotary principle with 'Geneva mechanism', the washer is ideal for washing glass, plastic and other materials of bottles for the pharmaceutical and chemical industries. The rotating platform with a series of simple operation gives the bottles a clean washing within a short time. The bottle holder has a unique design to accommodate bottles with varying neck diameter and bottle diameter. External cleaning of the bottles is done by spraying showers. Timing and sequence of washing process can be regulated to suit

specific requirements of the products to be washed.

The Rotary Bottle Washer has many unique features, which match GMP standards. The output is 64 to 100 bottles per minute. It is provided with four separate stations for inside wash and one station for outside wash. The specially designed cups are provided on the platform to accommodate any size of bottle in the range of 100 ml to 500 ml. Absence of rotating carbon plate eliminates leakage and minimises maintenance. The stationery washing nozzle ensures that there is no contamination from the wash water to the bottles. Individual solenoid valves for each wash makes the equipment the least complicated unlike the other conventional models available in the market. It is fitted with higher capacity centrifugal pumps for sufficient water and

pressure required to wash large sized bottled (500 ml and 1000 ml). The machine can also be modified for washing 1000 ml IV fluid bottles, for which a maximum of six washing stations can be provided. The electrical load is 5 KW and the gross weight of the equipment is hardly 1,050 kg. And best of all, Kothari Pharma's Rotary Bottle Washer assures significant saving in water, energy and time.

For further details, contact:

Kothari Pharma

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Jarimari, Andheri-Kurla Road
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Tel: 851 0837/ 2794, 859 2888
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XANTHAN GUM / ASPARTAME

Due to the extraordinary properties as stabilizer and thickener, Xanthan Gum is used in the food, cosmetic and pharmaceutical industry.

Xanthan Gum is also used in various industrial applications and for oil drilling. In all these areas Xanthan Gum is accepted as a useful processing aid and an improvement on the quality of the end product.

In the agrochemical industry Xanthan Gum is used in flowables to stabilize emulsions and suspensions. Xanthan Gum is compatible with a variety of chemicals, has a good suspending properties and stability at elevated temperatures. The size

of the droplets is controlled during spraying and drifting is prevented. These products have good cling to plants, increasing the contact time between active ingredient and crop.

Lianyung Foreign Trade Corporation (II) of China supply Xanthan Gum through their agents, Kemefs Value Additives Pvt. Ltd. The company are also the sole selling agent in India for Wujin Nutang Chemical Plant, China for Aspartame USP 29.

Aspartame is used as a sweetner that guarantees great taste and superior, balanced profile for your products. It is

used in most of pharmaceutical formulations.

For further details, contact:

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Andheri (W), Mumbai 400 053
Tel: 6350955-64 (10 lines)
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AUTOMATIC / SEMI AUTOMATIC FOOD PROCESSING PLANTS

Valley Pulses Pvt. Ltd. provides semi and automatic plants and equipment for bakery, pasta, icecream cones and machines. Besides this, being a merchant exporter, the company also export frozen products like Chillies, Ginger, Garlic and Chilli-Ginger mix and various other vegetables.

Bakery and Biscuit Products Automatic and semi automatic plant and equipment from **Sottoriva**. They include Equipments for samosas, chapatis, dumplings, pizzas, pie, puff pastry, croissants, etc. machines for all operations i.e sheeting, cutting, rolling folding, shaping, turning and equipments like mixers, dough kneaders, provers, rounders, dividers, deck and rotary ovens.

Pasta Plants machineries and equipments for short/long cut vermicelli (sevia), spaghetti, macaroni are from **Anselmo SRL, Italy**.

Ice Cream Machines from **Ice System, Poland** and **Bravo, Italy** are small machines which are unique because they simultaneously pasteurize, mix and whisk both ice creams and wide range of high quality confectionery. They also offer Softy icecream machines, Slush machines, Icecream cabinets from 2.5 litres to any size and also high quality display unit.

Sugar Cone Machines from **Gabbrielli** is one of the largest producers of automatic machines for ice-cream cones, fan shaped wafers, wafer rolls and wafers etc of any type, shape and size as well as rolled cone imitation with high sugar content. They also provide semi-automatic machines with changeable moulds for making ice cream cones, cups and double cones of various sizes and capacities. **Gabbrielle** has developed a new micron machine, which is simple, very solid and reliable and can be operated by unskilled workers also.

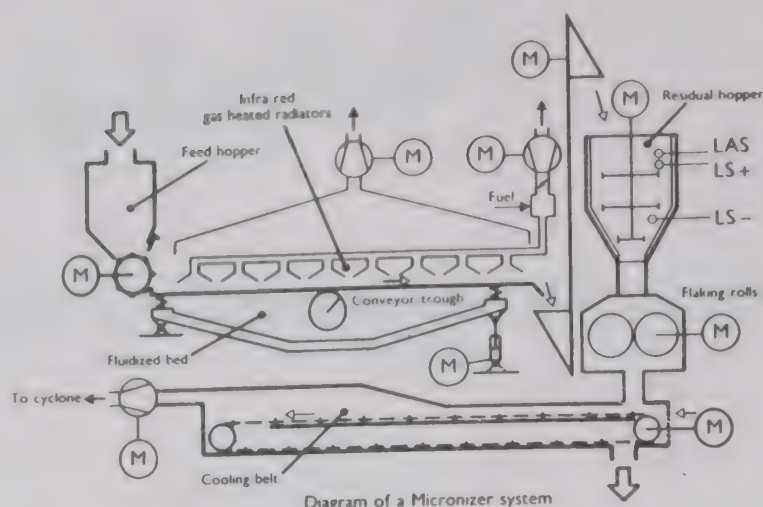
Flour Mill Plant: Plant and equipment with 30 to 200 ton capacities are from **GMF-SPA, Italy**.

Frozen Food Products like Ginger, Garlic, Green Chillies and Ginger, Green Chillies Mix are filled in a polystyrene (food grade material). An aluminium foil is used to seal the container to preserve the essence of the product. The products are frozen and have a shelf life of one year. These frozen spices are excellent for any variety of vegetable, meat and poultry etc. preparations.

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INFRA RED MICRONIZING SYSTEM FOR SOYA BEANS



Flow diagram of an infra red Micronizing system for Soya beans

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Advantages: Micronizing's infra red thermal system is a proven economical answer for consistent inactivation of these toxic enzymes, without loss of lysine or

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IRPL handles projects ranging from supply of equipments to near turnkey contracts including design, procurement of plant and material, delivery to site, installation, commissioning, sales and spares service throughout the country.

They assist the client at every step from the concept to commissioning. They also assist in marketing in some cases. They have a tradition of committed and sincere after-sales services. In addition to providing systems for the sea food, dairy, beverage and food industries, they can also contribute to the chemical, plastics and pharmaceuticals industries.

IRPL was formed in 1974 and is a part of 40 year old Allstate Group also involved in Transformer and Bowling Alley

Equipment.

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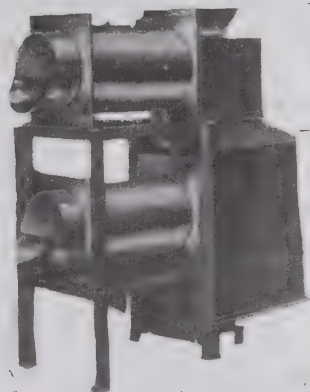
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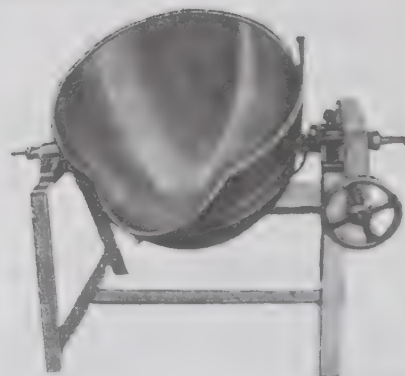
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The company gives high quality engineering solutions to machinery and spare indigenisation for either manufacturing unit ventures or end users with effective preventive maintenance plans. Boncon has extensive experience with Indian, Italian, Germany, English and American machines, both in India and overseas.

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Andheri (E), Mumbai 400059
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Tel/Fax: 850 6381
Email: boncon@bom7.vsnl.net.in

WHISKY FILTRATION

Filtration of whisk(e)y, either single malt or blended types, after blending is vital to ensure life, stability and good clarity. To this end the removal of hazes and the precursors to haze formation, is particularly important. Consequently, the steps used in filtration of different types of whisk(e)y require careful control and correct choice of filter equipment and media. Carlson Filtration is highly regarded for its expertise in the area of whisk(e)y filtration and has developed a number of high performance filter sheets specifically for the industry.

There are two types of haze and precipitation problems associated with whisk(e)y, which can be broadly classified as chemical and physical:

Chemical hazes result from trace metal contamination and the consequent formation of metal complexes with tannin and colouring matter. The problem of trace metal contamination can be reduced by careful choice of materials used in process and production plant. Another source of chemicals haze arises from the water used to reduce whisk(e)y to bottling strength. On dilution whisk(e)y produces a turbid, cloudy appearance which reaches an equilibrium after about 24 hours, prior to filtration.

Physical hazes and their associated precipitation problems are much more difficult to deal with. These physical hazes require liquid/liquid separation as opposed to the elimination of solid particulate matter usually associated with filtration. The liquid phase requiring removal from whisk(e)y comprises ethereal oils. The problem of their removal is made more complex because they may show up as a haze in

As the water is in the form of bound moisture, there is no microbial growth. Vitacel is temperature resistant and does not undergo changes in oleic and alkaline solutions.

Vitacel Wheat Fibres find application in baked goods, processed meat, snacks by keeping the product fresh for a longer time and also increasing yield and reducing fat consumption.

A special grade of Vitacel Wheat Fibre also has the property of natural anti-caking agents. It can be used in savoury flavours and dry blends for this property. Another advantage is the excellent flavour retention capacity of Wheat Fibre.

Apple and Orange Fibre finds usage in nutraceuticals, dietary drinks and specialized bakery preparations. The soluble fibre content in these fibres are more than wheat fibres and as such more therapeutic benefits in the product.

bottled product, despite the fact that the product may have been perfectly bright at the time of bottling.

Whisk(e)y shipped to countries with low ambient temperatures may throw a haze due to the temperature reduction. For this reason, most whisk(e)y is filtered after chilling to avoid this problem. Typical temperatures used vary between zero to plus 4°C. The sheet filtration process used in the whisk(e)y industry may be in lenticular or sheet filter format and either single or dual step: Single step filtration takes place at 0-4°C when bottling at 20°C and typically uses Carlson's specially developed XE280 sheet.

Double or two stage filtration is being increasingly used nowadays. Typically, the first stage uses XE5 for removal of larger particulate matter and XE350 is used to achieve high levels of polish or clarity in blended products. XE200 is used for the polishing step for single malts. It is very important to avoid any surging or pressure shocks whilst filtering whisk(e)y because there is a build up of viscous oils on the surface of the filter sheet and excess flow rates or significant variations in pressure may force these oils through the pores of the sheet. The maximum pressure drop tolerable across most filter presses is 2 bar and this level usually indicates that the filter needs to be cleaned and redressed.

For further details, contact:

Carlson Filtration (India) Pvt. Ltd.
203 Malwa, Patanwala Estate
LBS Marg, Ghatkopar (W)
Mumbai 400 086
Tel: 500 6755, Fax: 5001358
Email: carlsonindia@carlson.co.uk

Tomato Fibre has excellent water retention and very good gelling properties. It can be used in ketchups and purees. In fact, it helps in preventing phase separation.

Vivasoy soy milk powder has excellent usage in nutraceuticals, high energy foods and coffee creamer. It is by itself a complete food with excellent combination of protein and fats. This product has no sugars and a high content of poly unsaturated fatty acids. Thus making it an ideal product to be incorporated in nutraceuticals for therapeutic segments.

For more details, contact:

Clarico-FPC (India) Pvt. Ltd.
601, Gateway Plaza
Hiranandani Gardens, Powai
Mumbai 400076
Tel: 91-22-5704411, Fax: 91-22-5704412
Email: info@clarico-fpc.com
Visit us at: www.clarico-fpc.com

PURE-GEL® STABILIZED STARCHES

Grain Processing Corporation are manufacturers and suppliers of pure food starches offers PURE-GEL® Stabilised Starch which are designed to provide stable viscosity in the presence of extended heat, acid and shear conditions.

For processed meat applications, the PURE-GEL® products provide excellent economic benefits including increased water holding capacity, moisture management, and improved yield at a reduced hydration temperature. In dairy applications, the PURE-GEL® starches are utilized to suspend solids, enhance mouthfeel, and provide a stable viscosity in refrigerated conditions.

PURE-GEL® products are easily hydrated in high-fat sauce systems and provide steam table stability for gravies and sauces. For thermally-processed fruit filling, the low hot viscosity results in reduced back pressure and better fruit integrity.

Grain Processing Corporation is a privately owned company with head quarters and main production facility located on the banks of the Mississippi river in Muscatine, Iowa.

For further details, contact:

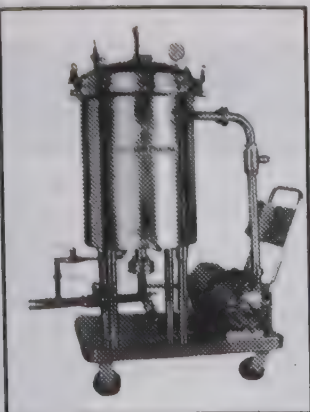
Grain Processing Corporation
1600 Oregon Street
Muscatine
Iowa 52761 USA
Tel: 319-264-4265, 800-448-4472
Fax: 319-264-4289

DIETARY FIBRE CONCENTRATES

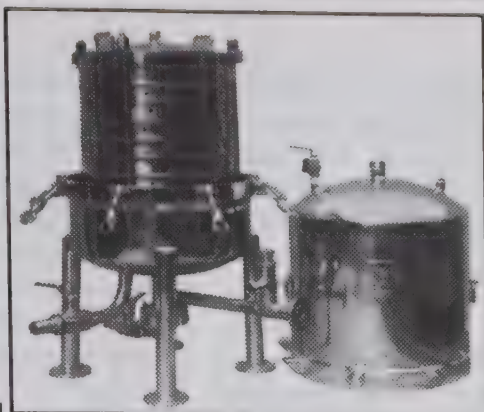
Clarico-FPC (India) are the marketing agents of J. Rettenmaier & Sohne, GmbH & Co., Germany for their various range of natural food ingredients widely used in processed food industry. J. Rettenmaier are the world leaders in insoluble dietary fibres under brand name VITACEL.

Vitacel wheat fibres are neutral in taste, odourless and have excellent water retention capacity. The fibres hold water by capillary effect and the release is slow.

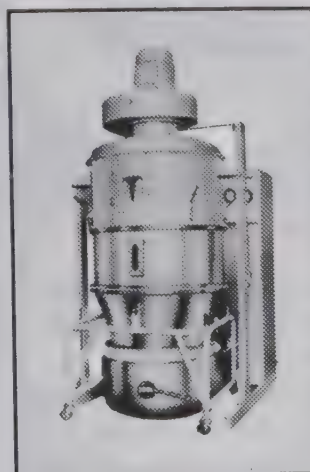
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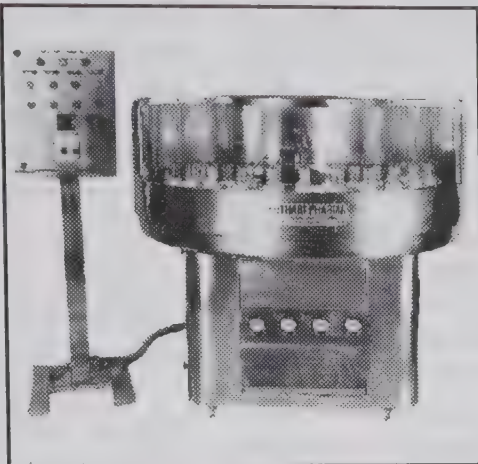
**Filter Press
standard model
with back wash**



**Filter Press
Zero hold up (Reverse flow)
with back wash**



Fluid Bed Dryer

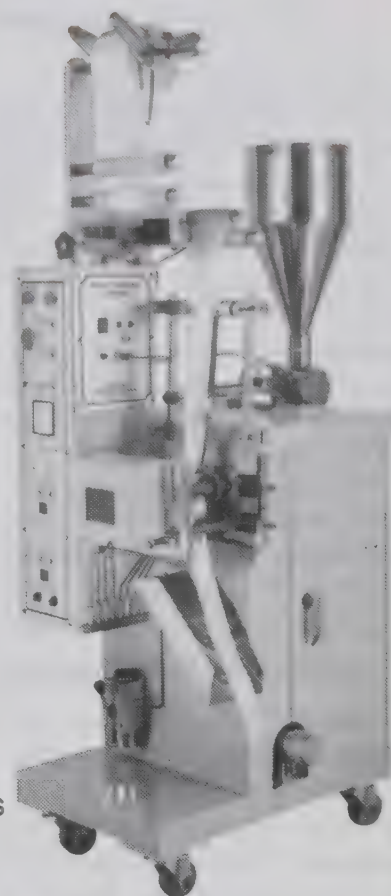


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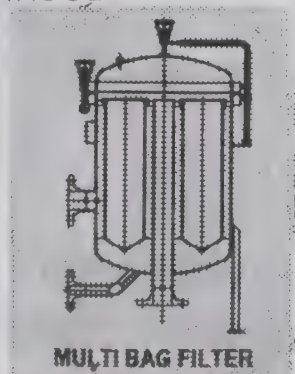
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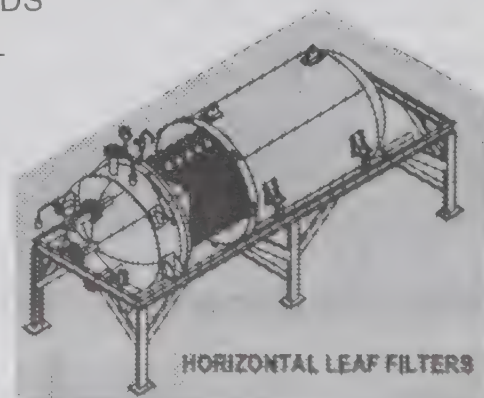
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Websites: www.indianlink.com/sharpenn, www.indiamart.com/sharpenn

RANGE OF EQUIPMENT

Adam Fabriwerk Pvt. Ltd. design and manufacture equipment for food, ayurvedic and allied industries keeping in view the technological developments in the world.

We offer complete manufacturing facility for Shrikhand with GMP (paint free construction) and CIP and SIP for batch size of 100 to 5000 kgs. The facility consists of manufacturing vessels / transfer pump / working platform / product piping / storage vessels / electrical control panel / vacuum pump / metering pump.

The salient features of our facility are: ● The plant is designed to be operated and one helper. ● Material transfers are done by vacuum. ● Vessels are GMP (paint free

construction) and are suitable for vacuum. ● Gaskets used are of silicon (food grade). ● Contact parts are of SS316 and are finished to class 4B (Mirror) finish and are crevice free. ● Entry of high shear emulsification head is from bottom through a specially designed mechanical seal and water circulation system equipment with water detection sensor. ● The high shear emulsification head is bottom mounted and acts as a pump to recirculate the products during manufacturing and discharges the product in storage vessels after the process is completed. ● Vessels are designed for 1kg /sq. cm. and 700 mm vacuum and can be sterilised. ● The storage vessels are of 500 kgs. for all sizes of plant above 500 kgs. and are mobile and can be con-

nected to the filling machine through digital metering pump. ● Pipes, pipe fitting and valves are of SS 316, seamless, internally electropolished with DIN standard unions. ● The control panel visually shows all operations of the plant on a mimic diagram. ● Manhole of all the vessels are equipped with davit fitting and the cover of the manhole slides instead of being lifted.

For more details, contact:

Adam Fabriwerk Pvt. Ltd.

203, Rajgure Apts.,
New Nagardas Road
Andheri (W), Mumbai-400069
Tel: 022-8380548/8384173
Fax: 022-839-0195
Email: adamfab@vsnl.com

DEHYDRATED ONION/GARLIC

Janak Dehydration Pvt. Ltd, was established in 1992 with the dynamic and pioneering zeal of N.L. Mehta with over 50 years of experience in the agricultural business. The company owns hundreds of acres of plantations in Mahuva, Bhavnagar, around its factory, which is located around 800 km from Mumbai.

The major crops being cultivated in their plantations are onions, garlic and other vegetables. All these products are processed and exported to all main European ports including Canada, Latin America, Australia, New Zealand, Japan, Korea, Taiwan, Hong Kong etc.

The company is managed by a professional team specially qualified in the field and having vast agricultural business background. The company has a total business turnover of 4000 MT of fresh onions

annually. The total processing capacity is 6000 kgs of final product per day.

The company has its own warehouses with storage capacity of 5000 MT of raw onions. Janak Dehydration Pvt. Ltd. employs over 500 persons in its premises.

The Dehydrated Onions are available in three colours, white/red/pink - and in different forms like Flakes, Kibbled, Slices, Rings, Mince and Powder.

For further details, contact:

Janak Dehydration Pvt. Ltd.

B-305, Sunder Dham
Ram Baug Lane
Off S.V. Road, Poisar
Borivali (W)
Mumbai - 400 092
Tel: +91-22-8074436, 8061113
Fax: +91-22-8612735
Email: jkmehta@bom5.vsnl.net.in

LIDDING FOILS

Eskay Flexible Packaging Industries manufacture high quality printed aluminium lidding foils.

Their range of products include various foils for HDPE, PET, HIPS containers, for packing of edible oils, ghee, shrikhand, tea, spices, glucose, etc.

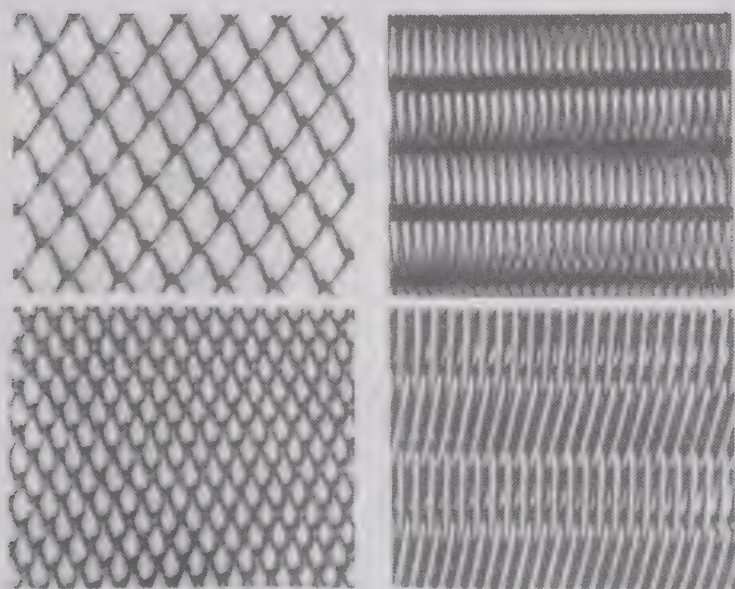
The company also offers hologram foils and portable foil sealers.

For your requirements, contact:

Eskay Flexible Packaging Industries Pvt. Ltd.

11, 212, Daulat Udyog Bhavan
Wadhavli Village Rd.,
Chembur, Mumbai 400 074
Tel: 5580996
Fax: 91-22-5500125
Email: eskay_15@vsnl.com
eskayflex@yahoo.com

METALLIC CONVEYOR BELTS



TNF Engineering is among the leading suppliers of Metallic Conveyor Belts in India. The Belt division of TNF Engineering was started in the year 1979 and since then it has catered to various process engineering applications where the

strength of steel is the only possible solution. TNF Belts are manufactured with best quality wires available in the market with quality workmanship and precision going into every Belt manufactured.

TNF can provide Wire Conveyor Belts to withstand a temperature range of 10° Celsius to 1150° Celsius. Each Belt manufactured by TNF is factory inspected for accurate specifications and workmanship. TNF Engineering manufactures Belts in various weaves and specifications to meet process requirement of any application. TNF Engineering also manufactures non standard Belts as per client requirement, specification or samples.

Among the various belt weaves some of the most common are: **Balance Weaves:** The balance weave consists of left and right hand spiral coils joined together by crimped cross members. The balanced spiral weave

Belts are the most widely used Belts due to its high flexibility, even distribution of pulling forces and straight running of the belts.

Closed Pitch Gratex Weaves: The Closed Gratex belt Weave consists of very close pitched left and right hand spiral coils weaved together with straight cross members. The closeness of the weaves results in strong longer lasting Belts even in high temperature.

Conventional Link Weave: The Conventional Link Weave consists of either left or right hand spiral coils interlaced together to form a continuous Belt. These type of Belt are generally used for drying of light food articles etc., where high air circulation is needed.

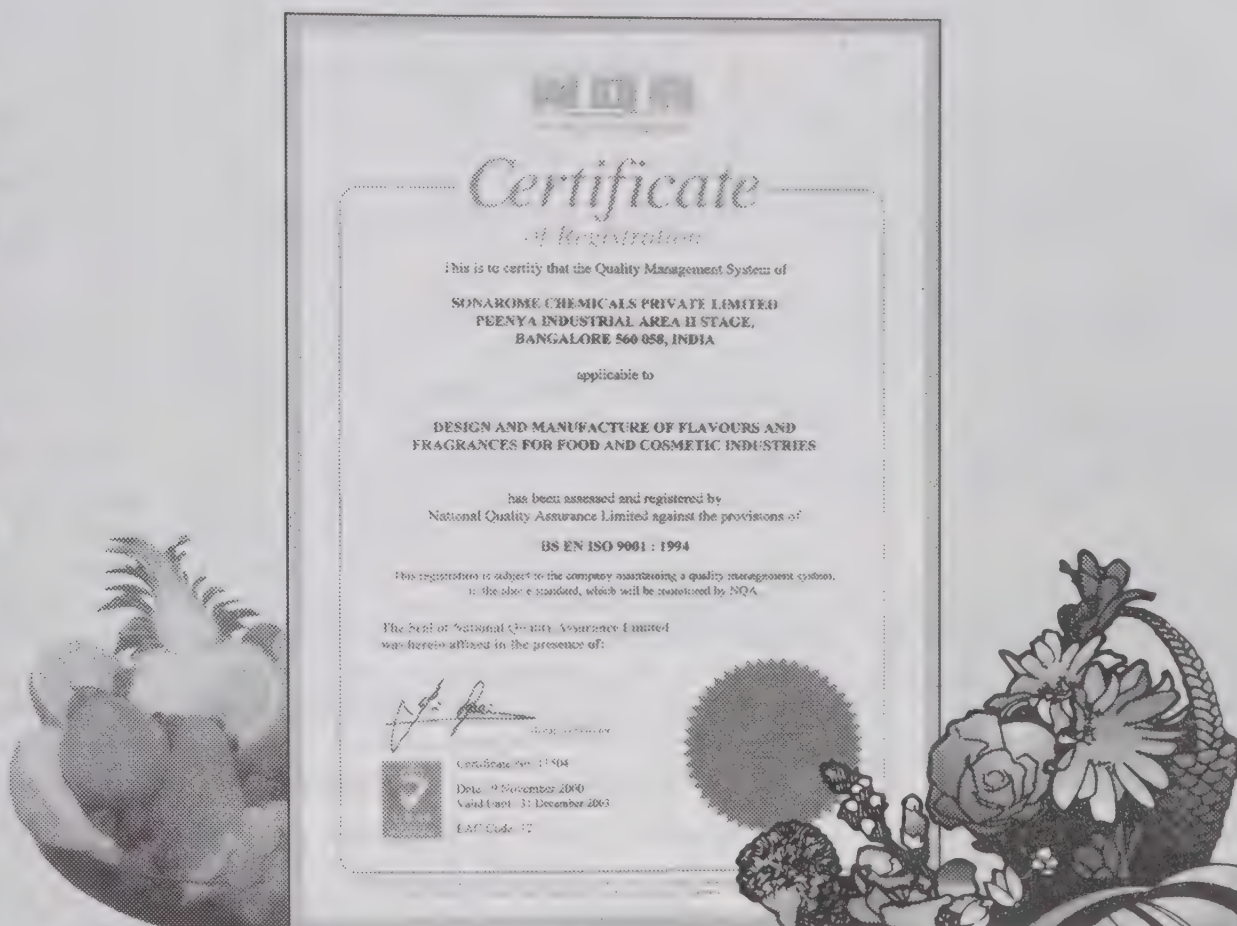
Rod Reinforced Weave: This weave has relatively elongated spiral woven together and reinforced by inserting a straight cross rod between them.

For your requirements, contact:

T.N.F. Engineering

Plot No.72 B
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HiMedia Laboratories Limited

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Mumbai 400086

Tel: 500 0970, 500 3747

Fax: 022-5005764, 5002468

Email: sarojw@giasbm01.vsnl.net.in

Website: www.himedialabs.com

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The company supplies from ready stock on behalf of principals the following:

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The company also supplies Benxyl Chloride, Benzyl Acetate and Benzyl Dehyde.

All the above products find application in Food, Bakery, Ice Cream, Beverages, Biscuits, Confectionery, Pharmaceu-ticals and Cosmetic Industries.

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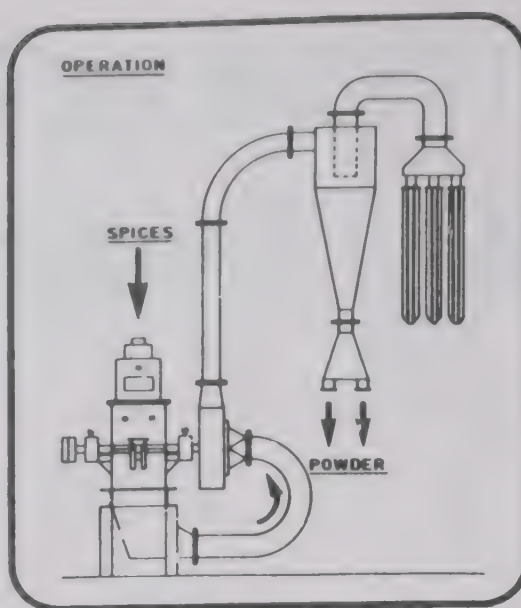
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Sion (E), Mumbai 400 022

Tel: 22-4091833/3210

Fax: 22-4082703

MASALA MILLS



The Masala Mill from Lithotech Engineers can be used for products such as chillies, turmeric, coriander, mixed spices, dehydrated onions and garlic, etc.

The machine chamber consists of swinging hammers side liners and top liners. As the material is fed into the machine through the feeding hopper, it gets pulverized between the swinging hammers revolving at a very high speed and the liners. The perforated screen fitted in the lower part of the chamber regulates the fineness of the pulverized

material depending upon its hole diameter. Once the material passes through the screen, it is sucked in by a blower unit mounted on the side of the machine, which passes through the pipe cyclone collector and finally discharged through the two way discharge valve. The air along with the very fine powder will go into the dust collector, where the material will be trapped into the filter bags and the air will be let out. The attachment of the dust collector ensures dust free operation. The free circulation of air into the machine keeps the chamber cool, thus retaining important properties of spices like taste and flavour and colour.

Salient Features are: • Retention of important properties of spices like taste and flavour and colour • Maintains uniform quality of product • Easy and economical dust free operation • Wide range of production capacities • Easy and economical maintenance • Sturdy construction • Ready availability of spares • Reliable after sales service.

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Lithotech Engineers

S-2/B-25, Sector 10

Shantinagar

Mira Road (E), Thane 401 107

Tel: 8110182 / 8113648 / 8113617

Fax: 91-22-8105808

Email: lithotech@vsnl.com

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Applications: Brush/Dip/Airless Spray. The coatings come in packs of 1, 5 & 20 litres.

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For further details, contact:

Manikant Brothers

257/65, Narsi Natha Street

Bombay 400 009

Tel: 3756977, 3752881

Email: everest_surfcoat@yahoo.com

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Special features of these are • compact skid mounted systems

• specially designed for individual application • Economical and fast delivery

The company also provides turnkey projects for manufacturing mineral/pure water.

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2/22, Panwala Bldg.

Dr. S.S. Rao Road

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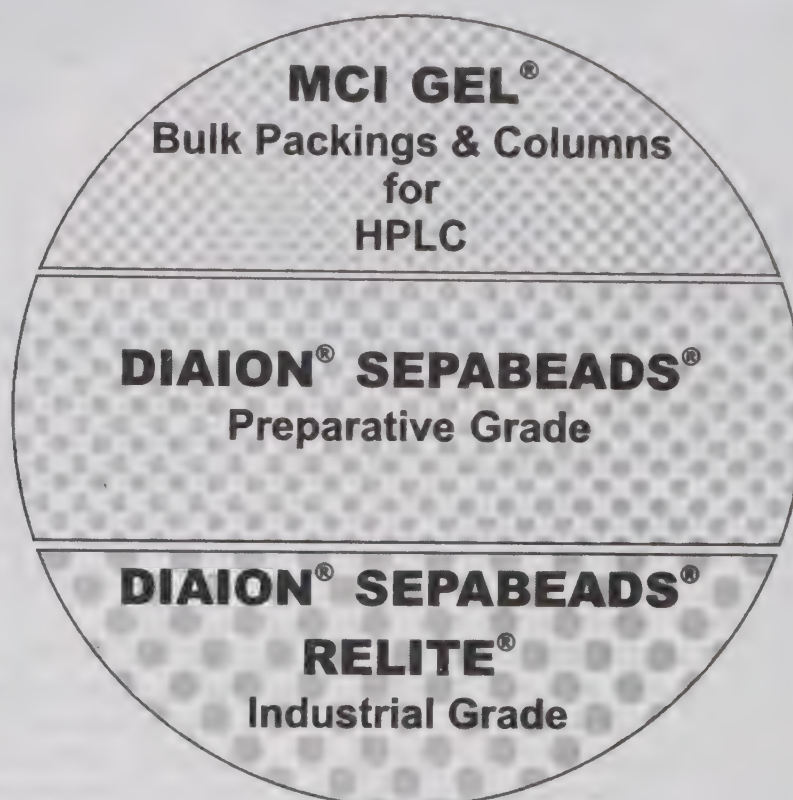
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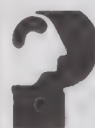
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INDUSTRIAL OVENS

Ovenman Industries Pvt. Ltd. are manufacturers and exporters of industrial ovens for baking biscuits and bread, barrel drying, pan masala drying, tin/metal printing etc.

The company manufactures Direct/ Indirect Gas/Oil fired as well as high breed travelling type biscuit baking ovens of most modern design suitable for baking short dough and hard dough biscuits like sweet, salty, marie etc. The ovens have specially designed tray conveyors suitable for baking/drying pan masala & tobacco.

The ovens are used all over India and abroad. Some of their esteemed clients include Britannia, Parle's, Bakemen's Nutrine, Amo-Tech Bakery in South Africa, Jawa Biscuits (Indonesia) Baba Biscuits and Kwaliti biscuits in Nepal.

Ovenman Industries also manufacture PVC/Crown Caps, Automatic Sheet Unloader, Pile Turner and Biscuit manufacturing plant.

For further details, contact:

Ovenman Industries Pvt. Ltd.

A/1, Veena Beena Apts.

Sewri (W)

Mumbai 400 015

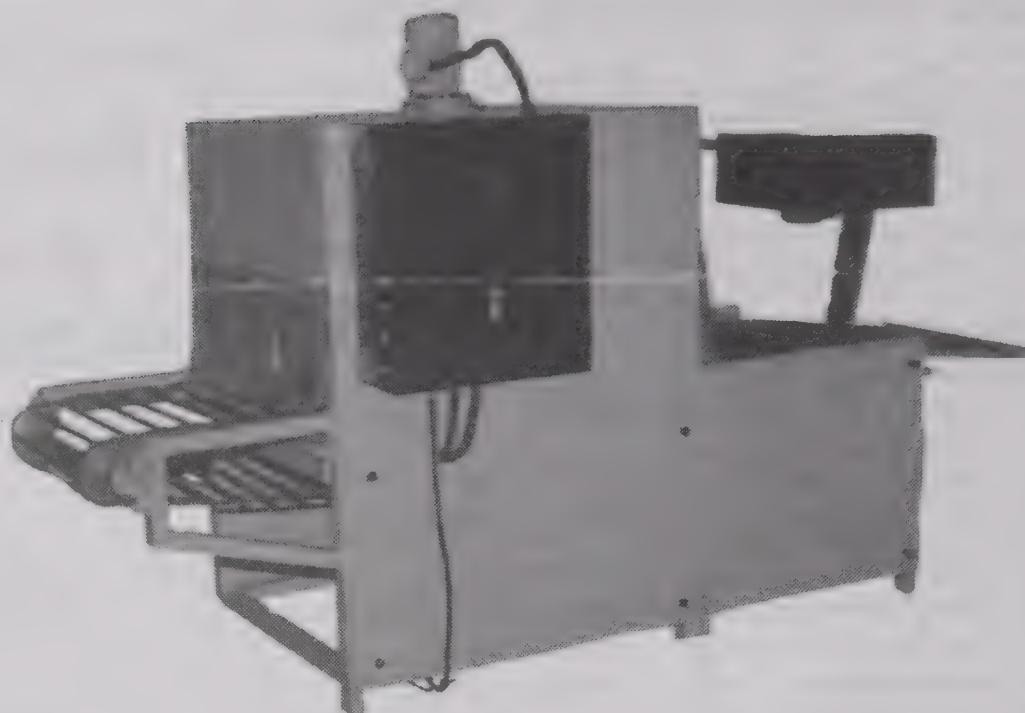
Tel: 413 0926, 414 0292, 416 8838

Fax: 413 7339

Email: aifso@bom3.vsnl.net.in

Website: www.aifso.com

SHRINK TUNNEL



Aarem Engineering is one of the leading manufacturer of Shrink Tunnel, which is an essential part of any Shrink Wrapping System. It is here that the actual process of shrinkage takes place. The products/pack is loosely wrapped in shrinkable plastic film and then passed through the Shrink Tunnel and gets tightly wrapped around the pack.

It can be used for Neck Sleeving of pickles, Jam Bottles, complete sleeving of masalas, instant food carton, Neck Lable Sleeving of Mineral water Bottle (PET),

unitising of Jam, Ketchup, Mineral water Bottles.

Aarem's manufacture Shrink Wrapping Systems tailor-made to suit your specifications and packaging needs.

For further details, contact:

Aarem Engineering

M-4, Kasturi Indl. Estate

Panchal Road

Bhayender (E), Mumbai 401 105

Tel: 8188560/8185643

Fax: 91-22-8183927

Email: shrink@bom.net.in

SOY PRODUCTS/TOPPINGS



Raiko Products is a pioneering Company which has made Soya a popular food ingredient in Bangalore homes.

Introducing their own brand "Soy-Joy" Soya Beans, Flour and Dal, with information, methods of cooking and recipes, the company has succeeded in convincing the

home makers to use "Soy-Joy" to nourish their families.

Sakthi Soya products of Nuggets, Flakes and Flour have a wider range of quality Soya products. These are supplied to leading stores in Bangalore and in bulk to other cities.

Rich's Whip Topping and Cooking Rich are non-diary products sold to leading Hotels, Restaurants and Bakeries. Raiko Products welcomes new processed food

items for distribution.

For further details, contact:

Raiko Products

132/B, 13th 'A' Main

H.A.L. II State, Bangalore 560008

Tel: 5261758 (O) 5356182 (R)

WEIGHMETRIC FILLING SYSTEMS

Spanpak Systems is a Mumbai-based company known for manufacturing new concept Semi Automatic and Automatic Volumetric Liquid Filling Machine. The company has now introduced filling systems by weight which are manufactured to high standards of quality and durability yet economical with sophisticated electronic functions for filling jerry cans, drums etc. accurately and efficiently.

The filling system has the following features: ● Non drip diving nozzles with automatic drip tray. ● Two stage coarse fine fill. ● Under fill protection (tops up automatically if filling quantity is less than target quantity). ● No container No fill. Heavy duty gravity roller conveyor on scale platform. ● Micro processor control system with backlit LCD digit height of 20 mm for easy readability with numeric key pad for easy fill cycle setting. Optional RS 232 port for further data processing or recording.

Parts in contact with the product either SS-304/316 or treated mild steel. ● Supplied with or without pumpset ● Also available explosion proof version. ● State of art design conforming to world standards Mettler Toledo weighing systems incorporated.

The company also manufacture optional equipments like entry and tail

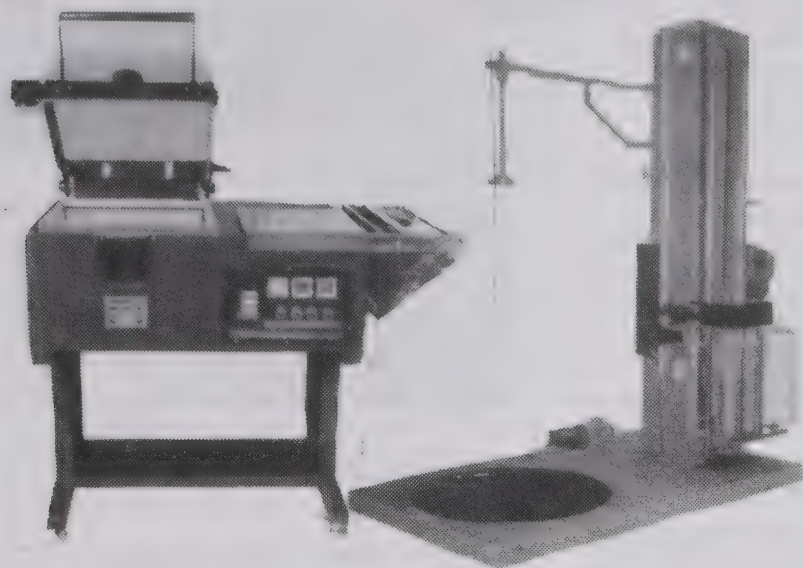
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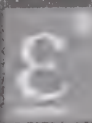
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Chemisol Adhesives Pvt. Ltd.

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Mumbai 400 023

Tel: 2625389/5520/6354/6452

Fax: 2625610

Email: bom@chemisol.com

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Qamar Fabrication Works are specialists in Food Processing machines such as pulpers, pulper-cum-finishers, retorts, pressure vessels, hemispherical dairy equipment, storage tanks, agitators and condensers, kitchen equipment, sterilizers.

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For your requirements, contact:

Qamar Fabrication

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Andheri (E)

Mumbai 400 059

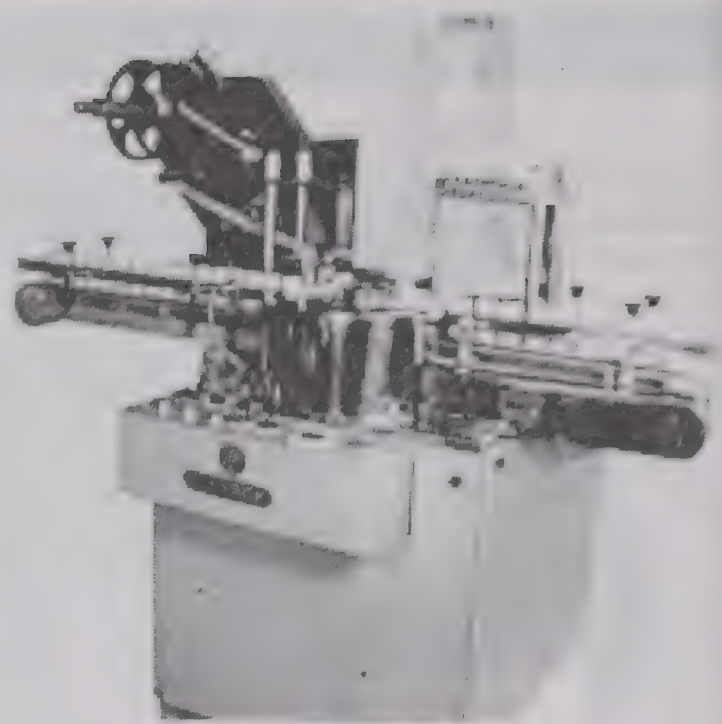
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FOIL SEALING MACHINE

This sealing machine from Jet Pack machines can be used for sealing the neck of PET/HDPE containers. The purpose for sealing is to prevent the product inside the container from pilferage or losing aroma, characteristics etc. The machine accommodates different type of foils like Aluminium Poly/Paper Poly/Lacquer Coated Paper etc. The machine can give speeds of upto 70 seals per min. depending on the size of the container and the weight. This machine finds application in Masala(chilli powder, hing, readymade masala etc), Glucose Powder flow wrap or any other hygroscopic powders, Pharmaceutical powders, Adhesives etc. The machine can be connected to filling as well as capping machine.

Other machines manufactured by Jet Pack are: Semi Automatic and Automatic (Single and Twin Head) Powder Filling Machine, Semi Automatic and Automatic (Single and Twin Head) Cream/Paste filling Machine, Automatic Capping and Cap Pressing Machine, Automatic Flow Wrapping Machine, Automatic Bottom Coding Machine, Automatic Composite Can Filling/



Sealing machine and Special Purpose Machine.

For further information, contact:

Jet Pack Machines

C-18, Nand Jyot Indl. Est.,
Safed Pool, Andheri Kurla Road,
Saki Naka, Mumbai 400 072.

Tel: 91-22-8516489/8515561

Fax: 91-22-8516489

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CARAMEL COLOUR

Caramel Colour has been used for generations to improve the taste and appearance of foods and beverages. Imparting colour ranging from delicate yellow to the darkest browns, it remains a versatile and cost efficient colouring agent.

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Caramel Colours find application in soft drinks, beverages, blended whisky, wines, brandy, vermouth. Also in bakery products, sauces, condiments, preserves, gravies, as well as in cocoa/chocolate, textured protein, candy/licorice, vinegars, dairy products, cereals and soups.

For more details, contact:

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Alok Chem Corporation also supplies other Gums such as Gum Guar, Gum Karaya, Gum Tragacanth, Gum Ghatti, Gum Ester. Besides these, Sodium Alginate, Gum Xanthan, Locust Bean Gum and Gum Carrageenan are also supplied.

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For your requirements, contact:

Alok Chem Corporation

405, Goradia House,
100/104 Kazi Sayed Street

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Mumbai - 400 003

Tel: 3426390/5365/3415668

Fax: 91-22-341 5668

The Company's S.S.I. Regn. No. is 55/55/PMT/SSI/08/084/00829 dated 05-01-95 and is a leading manufacturer of the following machines for the past 10 years

ON EDGE PILLOW PACK MACHINE, Model No. NII/HOM/100 (See pic.)

This model is suitable for packaging biscuits without inner wrap. The machine is specially designed with automatic feeding arrangement to precisely take the required stacked length and transfer the biscuits smoothly into the main feeding conveyor. The electronic digital temperature controllers maintain the accuracy of temperature for different packing materials. Speed is 40-100 packets per minute according to the size of the products.

HORIZONTAL PILLOW PACK MACHINE, Model No. NH/HPPM/150: This Model is suitable for packing prepack Biscuits, Ice, Candy, Soaps, Cream Wafers, Auto Spare Parts or any other product which can move on Conveyor Belt without falling. More than 70 Machines are giving excellent service to our clients in India, Nepal & Bangladesh.

CANDY PACKING MACHINE, Model No. NII/CPM/400: This machine has speed of 350 Candies per minute. Machine is of the finest quality. Recently "National Products, Bangalore" has placed order for 5 Machines.

CANDY TWIST WRAP MACHINE Model No. NII/CTW/300

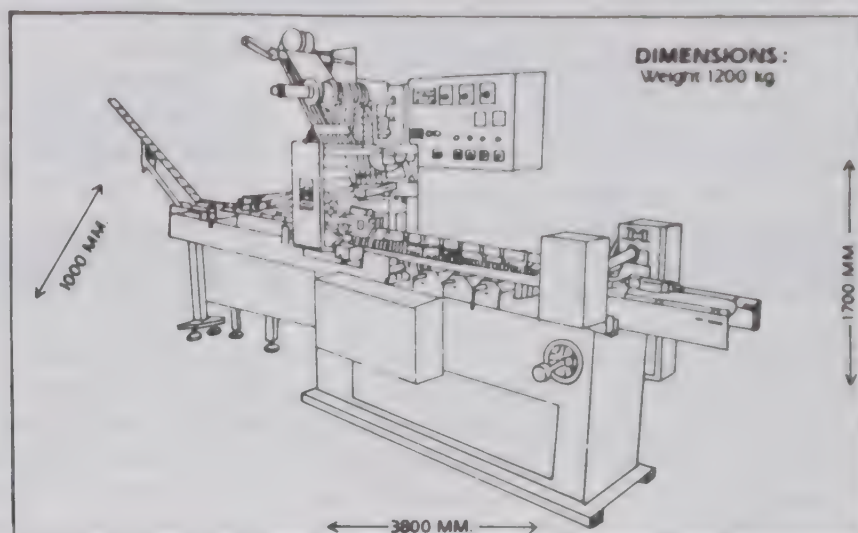
The Company also manufactures Wafer Cream Spreading and Wafer Cutting Machines and Tubes Expanders.

The List of customers include Cadbury India Ltd., Albert David P. Ltd., Kwaliti Ice Cream (Pvt.) Ltd., S.K. Industries (Mahak Pan Masala), Katana Food, Nutrine Confectionery, Bakeman, K.R. Biscuits, Amba Products, Crown Biscuits, Himani Limited, Mother Dairy, Creamica, Sweethome, Nilgiri Chocolates etc.

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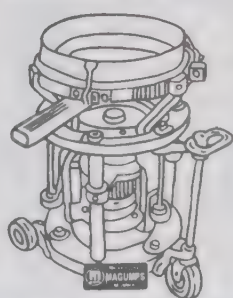
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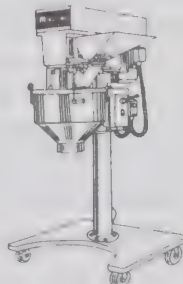


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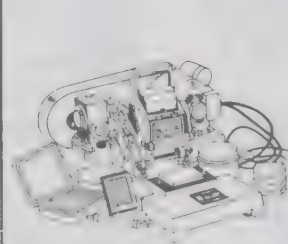
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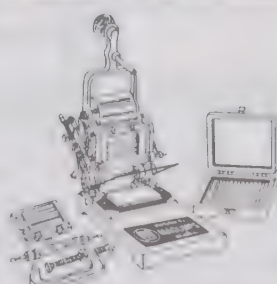
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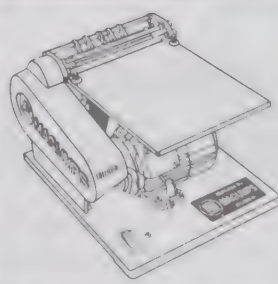
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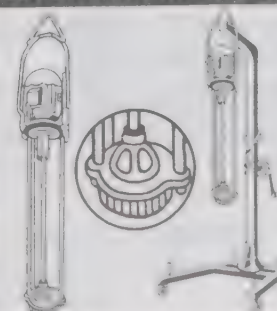
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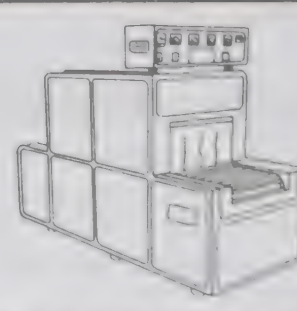
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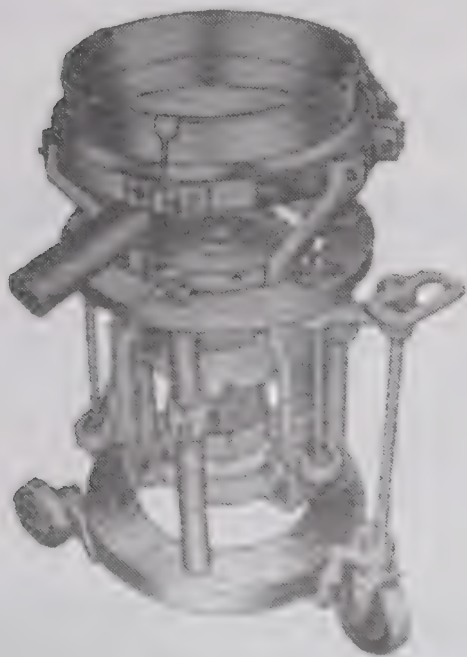
Premier has global out look and keeping this in vision they have business association with some international companies.

Premier is the authorised distributor for Technoblock Cold Room Units & Cold Room Panels of Refrigeration SPA of Italy in India. Premier Builds and Installs Custom - Designed Pre-Fabricated Walk in Coolers/Freezers. Technoblock is an ISO 9001 & CE certified company and they have received international recognition for quality standards.

Premier-Technoblock units can be used to maintain temperature of +5°C to (-) 50°C It is one of the largest companies in the world & they market their products globally in more than 160 countries and they make more then 40,000 units annually.

Refrigeration units include: • Variety of installations • A wide choice of models for each series • Quality of materials used • Care in manufacturing & testing

VIBRO SIFTERS



Magumps, already a well reputed and known name in the field of pharmaceutical bulk drug process industries for high quality equipment and plants introduces 'Vibro Sifter' which find application in dry separation, dry classification, straining, sieving, gradation, solid separation, solid classification etc.

The sifter can be used in pharmaceuticals, grains, fertilizers, animal feeds

• Particular attention to the development of new techniques, to the employment of new materials and to the European standards.

Features: ★ Wall mounting/Ceiling Mounting & Split System ★ Hermetic or semihermetic compressor ★ Condensation by air or water ★ Electronic control on the unit or the remote control panel, defrost by air, by hot gas or by heaters.

The panels are available in Polyurethane thickness of 60 mm to 160 mm thickness with width of 500 mm to 1500 mm. The panels are of International standard density 40kg/m³. The fixing is by camlock arrangements embedded in the polyurethane. The Polyurethane is sandwiched between two sheets. The floor insulation are base panels or slabs with vapour proofing and with marine ply and aluminium chequered plate.

Premier installs and maintains an extensive range of structures from modular coldrooms and massive coldstore complexes to Fireproof Freezer Rooms. Special environmental Test Bed Structures Accoustic Panels and Sound Baths.

For further details, contact:

Premier Refrigeration Limited

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Email: premierchiller@vsnl.com

abrasive pulp and paper foods, ceramics, minerals, water disposal, chemical and petro chemicals.

The vibro sifters are manufactured with all the product contact parts in S.S. (304 / 316 / 316L quality), and is available from 12" dia to 72" dia. The sieves used, have been newly designed, simple type with soldered rim similar to mechanical sifter for ease of quick change over.

These sifters are simple in construction, simple to use and maintain. They have no rubber parts and hence require minimum maintenance, 20 to 30% extra output than mechanical sifter, modular design i.e. additional decks can be added at any time very quickly, intensity of vibration can be changed by adjusting eccentric weight.

The Vibro Sifter can also be supplied with dust cover, complete S.S. covered body as per GMP. Over 20 units have already been sold for domestic as well as export market.

For further details, contact:

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97, D. Phalke Road
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Tel: 4113572/4154474
Fax: 022-4137648
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BACTASLYDE

To check bacteria in food products, Rakiro Biotech manufacture Bactaslyde which is used for detecting microbial contamination of all kinds of materials, viz. metal working fluids, process waters, food, soft drinks, etc.

Bactaslyde can be used by anyone as it is extremely easy to use and requires no capital investments. It can be used at site very effectively.

For further details, contact:

Rakiro Biotech

1 New Modella Industrial Estate
Padwal Nagar, Wagle Estate
Thane 400 604
Tel: 5836846

FOOD CHEMICALS

S.A. Chemicals with a global vision in mind has been surging ahead at an impressive speed to service the ever increasing needs of its customers. Qualified promoters, professional marketing team, emphasis on quality, effective after-sales service, timely and prompt dispatches and cost effectiveness are the company's trademarks.

Sorbitol, available in abundance from fruit like black grapes, apples, plums, cherries, pears, finds application in foods and beverages such as Candies, Drinks, Cereals & Snacks etc.

Dextrose, a monosaccharides sugar finds application in food and beverages like jams, jellies, icecream, chewing gums, meat, beer etc.

Liquid Glucose known as Glucose or Corn Syrup finds application in Confectionery, Bakery products, Ice Creams, etc.

Malto Dextrin (Spray dried) used in infant food/feed supplements, beverages, bakery and snack foods, dairy, confectionery, dry mixes, sauces and salads, is a spray dried product.

Other corn based products and modified starches from S.A. Chemicals are: Refined Corn Oil, Maize Gluten, Corn Steep Liquor, Dextrin, Oxidized Starch, Starch Ester.

Besides the above, S.A. Chemicals supply Casein, Folic Acid, Sodium Hydrosulphite, Calcium Carbonate, Lactose, Ascorbyl Palmitate, Calcium Gluconate, Whey Protein Dairy Blends, Distilled Monoglycerides.

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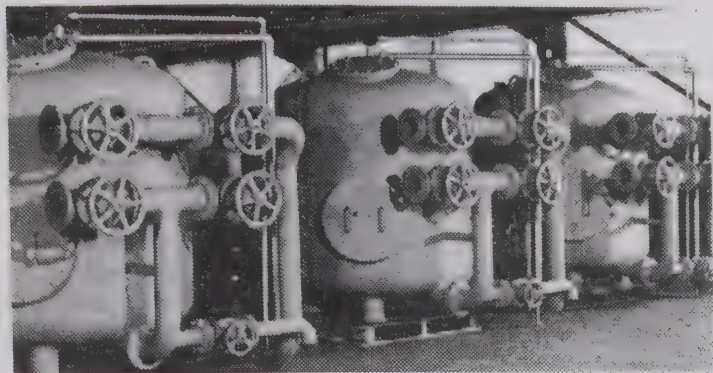
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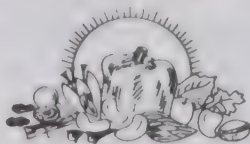
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**VITAL WHEAT
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FOOD PRODUCTS

Naram's are pioneers in making of Syrup Crush, Sherbat from kesar, badam, dry black currant, apricot, dry fig, mixed dry fruit, plum-peach, chocolate, kokum, thandai from natural and pure material.

Dr. Vidyutt K. Naram, a B.Sc. with Chemistry, has done Craft Diploma in Bakery and Canning from Dadar Catering College in 1982 and also has a Doctorate in Nature Cure from Delhi. The Nature Cure Federation of India was started by Mahatma Gandhi.

Vidyutt's wife Neela Naram, a B.Sc. DMLT and Cookery expert, looks after production. Syrup, Crush, Sauces and Chutney are manufactured using quality ingredients. Process parameters are carefully controlled and have desired characteristics, quality, suitability, acceptability by people. She has developed authentic Pani Puri Concentrate, Hot and Sweet Chutney, Amla Spread, Picante (Pizza) Sauce, Ginger Spread and Dessert Sauces etc. A special variety are exported to different countries and are available at leading Dry Fruit shops in Mumbai, Pune, Gujarat and Hyderabad etc.

This quality products are ideal for Milk Shake, Juice Parlour, Desserts, Sweet meat, Bakeries, Caterers, Ice cream Toppings and for daily use.

Recently they have developed Amla Syrup, Tulsi-Honey, Cola, Chat Chutney and Sugarless Khajoor Pak and Dry Fruit Fudge.

Quality control is a mantra in the organisation. This has been proved beyond doubt that even a small scale unit can give best quality products made from pure ingredients."

For further details, contact:

Naram's Food Products

Post Box No. 7694

Mumbai 400 067

Tel: 887 3328 / 4035

Fax: 898 1317 / 886 1202

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users would be freed from the task of extracting milk. Less space would be required for storage and extended storage life would be possible.

Palmo can be used in the manufacturing of biscuits, confectionery, Icecream and other food industries where coconut aroma and taste is needed.

Palmo Coconut Milk Powder is
* Convenient - Instant Coconut Milk

market.

It is now one of the leaders in food flavouring and is associated with quite a large number of Industrial houses, having a clientele of over 2000 in the domestic market, confectioneries, fast foods, pharmaceuticals etc.

Presently, the company is manufacturing various natural Essential Oils, Aromatic Chemicals and Speciality

The Company started the manufacturing of Flavours a few year later and received a very good response from the

WATER PURIFICATION / TREATMENT PLANTS

The Water Purification and Treatment Plants from Environment Products (India) Pvt. Ltd., provide high purity bacteria free water for diverse industries such as food, fisheries, poultry, beverages, pharma, electronics, etc.

Water Treatment for POE/POU systems, potable purpose, aquaculture, mineral water, sewage and effluent requirements can be carried out by these machines. Accessories provided include dosers, filters, softeners, polishers, ozonators, UV systems, reverse osmosis, filtration plants, chlorinators, micron filters, DM/DI Plants; clarifiers and aerators.

The equipment accessories are manufactured for mineral water as per CODEX ALIMENTARIUS specifications which is the WHO standard for pure water.

Technical Consultancy and Turnkey Projects for swimming pool, mineral water treatment and bottling plants are provided by the company.

For more details, contact

Environmental Products (India) Pvt. Ltd.

160/3, Rajani House

Opp. Don Bosco High School

L.T. Rd., Borivili (W)

Mumbai 400 091

Tel: 8013601/801698

Fax: 022-8621506

FORM-FILL-SEAL MACHINE



The fully automatic vertical form-fill-seal machine from Gurdeep Packaging finds application for packing any free flowing powder and granules, spices, soup-concentrates, soft drink concentrates, pharmaceutical powder, detergents, tea/coffee, pan masala, supari, confectioneries etc.

Specifications:

Sealing Type: 3 sides sealing/4 sides sealing. Packing Size: 50-120mm, or 100-240mm (film length). 20-160 mm, or 20-220 mm (film width). (enlarged type can be made upon order). Speed: 45-90 bags/min, 60-120 bags/min. (Depending on flowing rate and volume on packing objects). Packing Material: All heat sealable laminate PET/POLY, PET/FOIL/POLYMET, PET/POLY/OPP etc...

For your requirements, contact:

Gurdeep Packaging Machines

Harichand Compound,

L.B.S. Marg,

Vikhroli

Mumbai 400 079.

Tel: 5783521, 5772846, 5795982

Fax: 91-22-5772846

* Economical - Only the valuables presented * Hygienic - Processed in aseptic condition * Bio friendly - No artificial additives used.

For further details, contact:

Sriram Coconut Products

P.O.No. 1, Batlagundu 624 202

Tel: 4543-22234, Fax: 4543-22572

Email: sriramco@md3.vsnl.net.in

SPECIALITY CHEMICAL / ESSENTIAL OILS

Established in 1966 by Mr. H.N. Gogia, Gogia Chemical Industries is a pioneer in orange oil cold pressed. They meet the requirements of all the major flavours and fragrances houses.

The Company started the manufacturing of Flavours a few year later and received a very good response from the

Chemicals, which are being sold across the country, and are also being exported to USA, European countries, Sri Lanka and South Africa.

For further details contact :

Gogia Chemical Industries Pvt. Ltd.

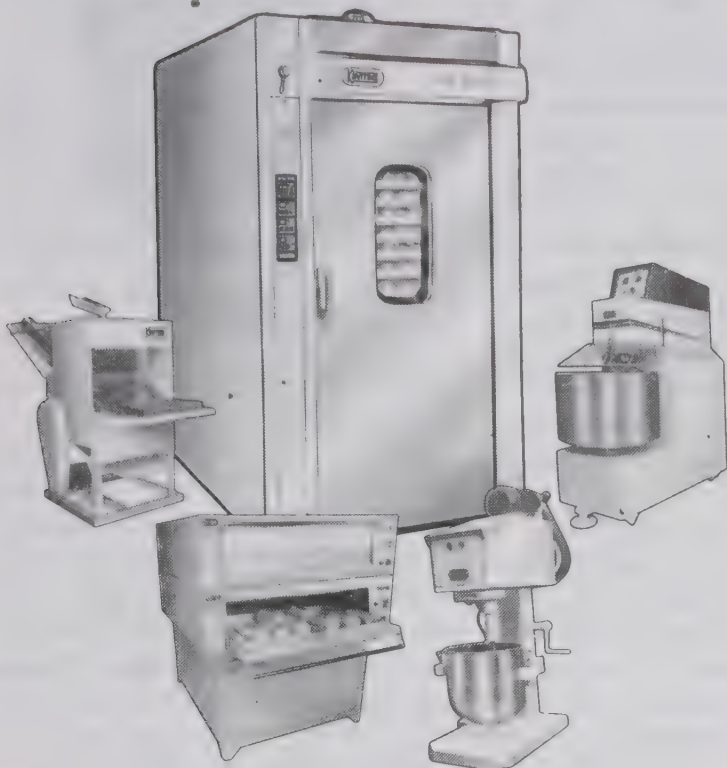
A-127, Okhla Industrial Area,

Phase-II, New Delhi - 110020

Tel: 6836007, 6910329, 6925664

Kovitins

Bakery Equipments



Manufactures of :

- Rotary Rack Oven • Modular Deck Oven
- Planetary Cake Mixer • Spiral Dough Kneader
- Gravity Feed Bread Slicer

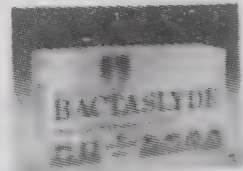


21 Nandlal Ramroop Estate, Ramkrishna Mandir Road, Andheri (E), Mumbai 400 059. Tele/Fax: 8230095

Did you know that invisible **Monsters** are **eating** into your product **quality?** **Yes, Bacteria!**

Bacteria cause : • Spoilage of food products, Milk and Dairy produce • Spread of disease through water and food products • Reduction of product quality and shelf life

Now detect Bacteria easily with **BACTASLYDE**



Microbiology laboratory not required

- Can be used by **anybody**
- Extremely **easy to use** and quick
- No capital investment • **Economical**
- Can be **used at site** very effectively.

BACTASLYDE can be used for detecting microbial contamination of all kinds of materials viz, Metal working Fluids, Process waters, Foods, Soft drinks, Paint and Pigments etc.



RAKIRO BIOTECH

1, New Modella Industrial Estate, Padwal Nagar, Wagle Estate, Thane - 400 604
Tel.: +91 (22) 583 6846

SHRIYAN

CARBONATED & NON CARBONATED PACKAGING MACHINERY



Automatic Pouch Filling Machine

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Soft Drink / Distillery
In Pet Bottle / Glass Bottle

WE ALSO UNDERTAKE TURNKEY PROJECTS

For further details contact:

SHRIYAN ENTERPRISES

B/5, Ghansyam Industrial Estate
Veera Desai Road

Andheri (W), Mumbai 400 053

Tel: 022 636 9057 / 8328

Tel/Fax: 022 636 8320

Email: shriflow@vsnl.com

Pune Branch

12 A, Sagar Complex, Bombay-Pune Road, Kasarwadi-Nasik Phata, Pune 411 034

Tel/Fax: (020) 7124341



Automatic Cup Filling / Sealing
Machine for Mineral Water / Juices /
Flavoured Waters

HIGH PRESSURE CRATE WASHER



Goma high pressure crate washer has been successfully working in various industries. The crates/trays are washed thoroughly by high pressure water jet only. There is no requirement of steam, detergent, chemicals etc. The machine is more compact and with minimum maintenance.

The crates/trays are conveyed automatically by conveyor chain fitted on stainless steel fabricated frame. The crates/trays pass through high pressure water jet nozzles having accurate spray angle for washing. The high pressure is generated by a high pressure pump driven through electric motor and mounted close to conveyor. The speed of conveyor is variable and can be adjusted to get optimum wash-

ing effect. The washing process is being made inside the stainless steel fabricated enclosure which prevents all egress of water. The enclosure has a provision for easily openable doors for maintenance purposes. Waste water is collected in a sump which can be connected either to the sewage system or can be reused passing through the special filtration system. The whole machine is provided with adjustable feet for levelling and needs no fixing to the floor. A separate

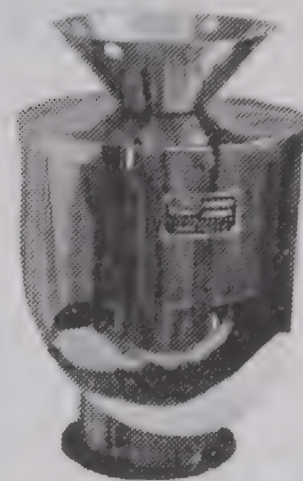
electrical control panel is being provided.

Advantages: • Fully automatic • Ensures optimum cleaning in the fastest possible time • Compact design for space saving • Time and man power saving • No need of steam, chemicals, detergents etc. • Low power consumption • Easy for operating and maintenance

For further details, contact:

Goma Engineering Pvt. Ltd.
Behind Universal Petrol Pump
Majiwada, Thana - 400602
Tel: 91-22 5340875/1438
Fax: 91-22 533 3634/2
Email: goma@bom3.vsnl.net.in
Website: www.gomaengg.com

WAFER CUTTING MACHINE



MODEL NO. KHI-015

Hari Om Industries are manufacturers and retailers of "Krishna" brand Food Processing Machines. "Krishna" Wafer Cutting Machine model No. KHI-015 is very useful for making wafers and chips of potato, papaya, coconuts, gourd, carrots etc. It is made from 18 gauge S.S. aluminium, light in weight and small in size, 33x36 cms. It works on 0.5 HP single phase or three phase electric motors. Consumes minimum electricity, easy to handle. It can cut 400/500 kgs per hour. It can also be used to grind wet substances at 100 to 150 kgs per hour.

The other "Krishna" brand machines are Potato/Papaya peeling machine, wafer/Seed drying machine, Banana chips making machine, Dryfruit cut pieces machine and grinder/slicer multi-use machine.

For further details, contact:

Hari Om Industries
Dhebar Road (South)
Atika Industrial Area Street No.3
Near Jaydev Foundry
Rajkot 360002, Gujarat
Tel: (F): 363620
Mobile: 98242 10251
Fax: 371745(R): 371438
Email: hariomind@epatra.com

SPRAY DRIED GUM ARABIC

Drytech Process (I) Pvt. Ltd, is a One Stop Shop for various kinds of Spray Dried Food Powders, be it Gum Arabic, Fruit Vegetable, Spice Blends or Caramel. The Company has extended its business horizon from manufacturing of Spray Dried Gum Arabic/Gum Acacia to Fruit and Vegetable Powders including Encapsulated Spice Oleoresins and Caramel Powder. Product ranges includes Gum Arabic (ARAGUM) and Food Powders.

In their fruit powder range are tomato, orange, lime, mango, banana, papaya etc. The encapsulated oleoresin powder range consists of black pepper, capsicum, ginger, garlic, cardamon, paprika etc. In the fat based powder range are groundnut, sunflower, soya, ghee, and sodium and calcium caseinate in caseinate powder range.

To fulfil your diverse requirements, Drytech Processes (I) Pvt. Ltd. manufacture ready-to-use Gum Arabic. Spray Dried Gum Arabic is pure, free from impurities with

uniform quality and viscosity. It is free flowing, with low moisture content thus ensuring longer shelf life. It saves on processing time, and cuts power and labour cost.

The unique properties of Spray dried Gum Arabic include emulsifying, stabilising, coating, binding and encapsulating. With the added advantages of adhesivity and calorie control, Gum Arabic is widely used in the manufacture of food flavours, soft drink, confectionery, chewing gum, coated nuts, bakery icing, syrups, diabetic and dietetic foods, asafoetida, medicinal tablets etc.

For your requirements, write to:

Drytech Processes (I) Pvt. Ltd.
B-16 Girikunj Industrial Estate,
Mahakali Caves Road
Andheri (E), Mumbai 400 093
Tel: 8378915, 8326494, 8301918, 8210401
Fax: 022-8242476, 8367442
Email: drytech@bom8.vsnl.net.in
Visit us at: www.drytechindia.com

FOOD CHEMICALS

Uma Brothers, the renowned company was established in 1975 and right from the inception of the company, they are supplying various chemicals to actual users and consumers covering a wide range of industries.

They supply Indian and Imported Food Chemicals, Antioxidants, Aromatic Chemicals, Amino Acids, Bread Improvers, Bakery Chemicals, Confectionery Chemicals, Dairy Chemicals, Defoamers, Dough Improvers, Dietary Chemicals, Emulsifiers and Stabilizers, Enzymes, Essential Oils, Edible Gum, Fatty Acids, Food Additives & Preservatives, Herbal Chemicals, Minerals, Nutrients, Vitamins (all types), Bulk Drugs & its intermediates.

When Replying to Ads Please Mention

BEVERAGE & FOOD WORLD

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IMPORTED & INDIAN FOOD CHEMICALS

* ASCORBIC ACID * ANTIOXIDANTS * ADDITIVES
 * AROMATIC CHEMICALS * AMINO ACIDS * BHT * BENZOIC
 ACID * BHA * BAKERY CHEMICALS * CONFECTIONERY
 CHEMICALS - FOOD GRADE * CAFFEINE & SALTS
 * CALCIUM SALTS * CITRIC * DAIRY CHEMICALS
 * DEFOAMERS * DEXTROSE * DOUGH IMPROVERS
 * DIETARY CHEMICALS * EMULSIFIERS AND STABILISERS
 * ENZYMES * ESSENTIAL OILS * EDIBLE GUM * FATTY
 ACIDS * FOOD PRESERVATIVES * HERBAL CHEMICALS
 * LACTIC * MONO SODIUM GLUTAMATE * MANITOL
 * POTASSIUM BROMATE/SORBATE/CHLORIDE * PROPIONIC
 * PROPYLENEGLYCOL * SACHARIN * SOD. BENZOATE/
 CITRATE * STARCH * SORBIC * VITAMINS-B1, B2, B6, B12,
 VITA, VIT.C, VIT.D, VIT.E * ZINC SULPHATE HEPTA/
 MONOHYDRATE ETC.

Contact :

M/S. UMA BROTHERS

C-110, Bhaveshwara Plaza, 189, L.B.S. Marg,
 Ghatkopar (West), Mumbai - 400 086 (INDIA).
 Tel: 500 4579-5004510. Fax: 091-22-5000015.
 Email: umabroth@bom5.vsnl.net.in

Bombay

Industrial Engineers

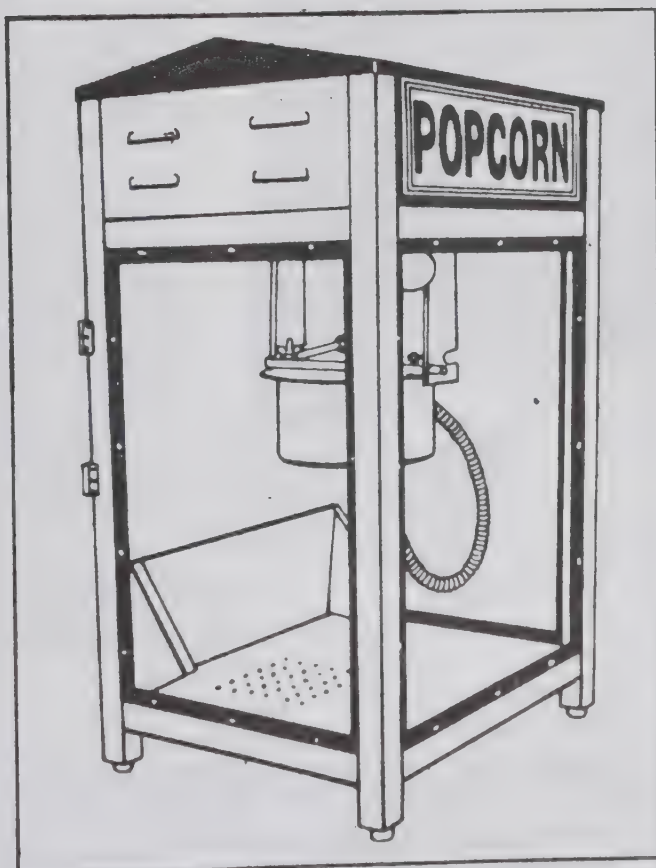
13, Crystal Apartments,
 Gulmohar Cross Road, 11 J.V. P.D.
 Bombay 400 049

Tel: 6232810 • Telefax: 620 1914

Email: ijseghal@bom5.vsnl.net.in

- * **FOOD PROCESSING MACHINERY:**
 Pulpers, Juice Extractors, Steam Jacketed
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 Cutter & Canning Retorts
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 Closing Powder Filling, Form Fill Sealing
 Machines
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- * Biscuit-Bread making Machinery
- * Toffee-Hard Boiled Sweet Machinery
- * Chewing Gum making Machinery
- * Cloth Raising Machine
- * Boilers - Thermopacks
- * Sigma Kneaders, High Speed Mixers
 Planetary Mixers & Powder Mixers
- * Weighing Machines
- * BOPP/Industrial Tapes Manufacturing
 Machine & Plant

POPCORN MACHINE



For Fresh & Crisp Popcorn

- Copper bottom vessel ensuring even heat and faster heating cycle.
- Thermostatic control of heater for safety.
- New look machine with simple and easy operation.
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Email: yusufs@vsnl.com Website: www.mmmmbuxabhoj.com

Fine Chemicals, Excipients etc. which find application in major industries like pharmaceutical, bulk drug, food, beverage, beer and alcohol etc.

For your requirements, please contact:

Uma Brothers

C-110, Bhaveshwar Plaza,
189, L.B.S. Marg
Ghatkopar (W), Mumbai - 400 086
Phone: 5004579-5004510.
Fax: 091-22-5000015.
Email: umabroth@bom5.vsnl.net.in

FOOD & BEVERAGE MACHINERY

Chhaya Enterprises are manufacturers of Food and Beverage Machinery. The company are specialists in manufacturing, Syringes, Lobe Pumps and Machinery parts. The Colloid Mill and Volumetric Fillers are used by Food and Beverage industry all over the country.

For further details, contact:

Chhaya Enterprise

C-5, Parle Colony, Sahar Road
Vile Parle (E)
Mumbai 400 057
Tel: 8329259 (R) 8205584

THINWALLED PLASTIC CONTAINERS

K. Raheja Mercantile Corporation are the manufacturers of transparent & opaque white injection moulded Plastic Containers ranging from 100 ml to 2000 ml. These containers are airtight, food grade, micro-waveable (for reheating) as well as deep freezable, and stackable are available in various shapes. The containers have multipurpose utility and used in various Industries and such as Food Packaging industry like for Ice creams, Shrikhand, Cheese, Bread Spread, Dairy Products, Carry Home Foods, Tea, Medicines etc.

For further details, contact:

K. Raheja Mercantile Corporation

108, New India Ind. Estate
Off Mahakali Caves Road
Andheri (E)
Mumbai 400093
Tel: 8382032/1529, 8394665/66
Fax: 91-22-8363458

CITRUS PRODUCTS

Southern Citrus Products (Pvt.) Ltd. is a food processing/agrobased SSI, engaged in the processing of locally abundant citrus lime fruits. This 15 year - old company has been taken over by a qualified technocrat 2 years ago and fully modernised.

Lime Oil: The company produces 3 types of Lime Oil - distilled, vacuum and cold pressed, which find application in the beverages, flavour and fragrance

REVERSE OSMOSIS SYSTEMS

Komal Drinking Water Systems offer leading edge Reverse Osmosis technology and performance within a compact, economical unit. Komal's three stage process utilizes a reverse osmosis membrane and pre-and-post filters Komal combines the resources of the two leaders in high purity water: Osmonic Inc. USA the world leader in Membrane Technology and Komal Industries, pioneer in Water Treatment Plants in India.

Komal manufactures off-the-shelf Reverse Osmosis System both for industry and to produce high purity drinking water for domestic purpose. R.O. System provides the ultimate in pure water requirement for drinking water and reduces the salts and eliminates organic, bacteria, virus and pyrogen. R.O. System can effectively be employed for reducing salt content of highly saline brackish water into drinking water. Plants are

preassembled and are ready to connect.

Standard sizes are available from 30 lts./hr. to 1000 lts./hr to produce excellent quality of drinking water. Trouble free, quiet operation and easy maintenance makes Komal R.O. System a first choice. Other advantages include: * Preassembled at factory ready to operate * Minimal, if any, pre-treatment required * Wide range of membranes available for different applications like ultra pure water production for electronic industry and laboratory * For purified water, free from bacteria, pyrogen * For Pharma and Unit for concentration and recovery of valuable material.

For further details, contact:

Komal Industries

108 Creative Ind. Centre
12 N.M. Joshi Marg
Lower Parel
Mumbai- 400011
Tel: 3091090, 3091174, Fax: 022-3062711
Email: kcc@giasbmol.vsnl.net.in

OZONE GENERATORS



Indizone is the first and only Indian made Ozone Generator that has been exported. Together with time tested technically superior equipment, Indizone comes with a backing of successful application methods that ensure results. The company's service back up is excellent. Indizone is available in various models to suit client's applications.

For further details, contact:

Ozone Technologies & Systems India Pvt. Limited

1-A, 12th Cross Street
Shastri Nagar
Chennai 600 020
Tel: 446 0443
Telefax: 491 4133
Email: otsil@vsnl.com
Website: www.otsil.indiaa.com

industries.

Lime Juice: An imported all SS, Polycitrus Line is used for producing 2.4 MT/hr. of hygenic lime juice. Sparkling, Clear Lime Juice for making Lime Juice cordial is also available in bulk.

Pectin: Citrus Pectin of any grade is made with latest technology and supplied to manufacturers of Jam, Jellies, Ice cream, Dairy and other Food industries.

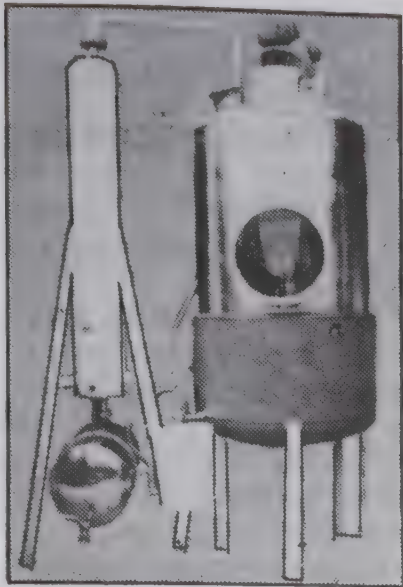
Other Products: Lime Peels (for marmalade), Citrus Fibre (for dietary applicants) and Calcium Citrate are the

other products supplied by Southern Citrus Products.

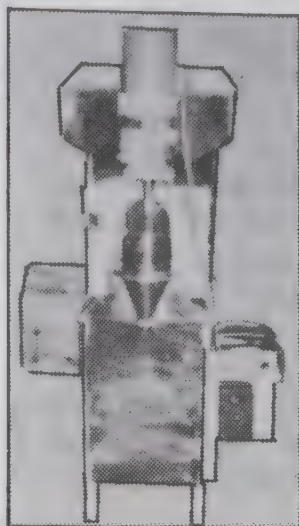
For further details, contact:

Southern Citrus Products (P) Ltd.

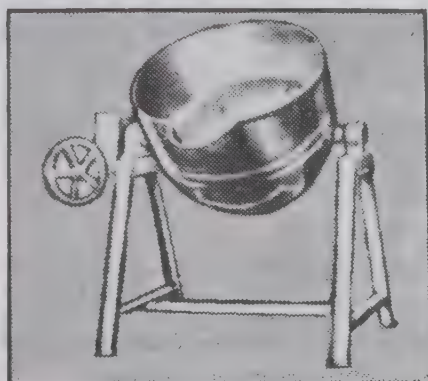
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15/337, Varada Nagar
Gudur, A.P. 524 101
Tel: + 91 (08624) 51321
Fax: + 91 (08624) 52958
Email: sagar@ctrus.com
scitrus@yahoo.com
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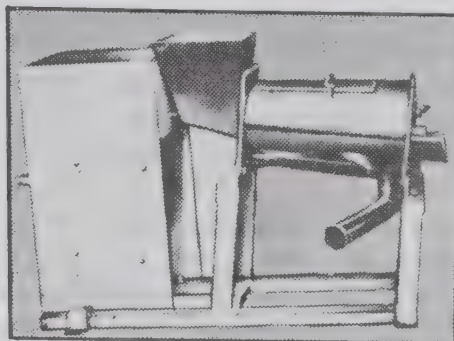
VACUUM EVAPORATED UNIT



PICKLE FILLING MACHINE



STEAM JACKETED KETTLE



PULPER

GEETA FOOD ENGINEERING

Manufacturers of Food Products Equipment & Fabricators

- STEAM JACKETED KETTLE
- PULPER-CUM-FINISHER
- PAPAYA CUBING UNITS
- PINEAPPLE SLICING MACHINE
- JUICE EXTRACTORS
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- PICKLE FILLING MACHINE (new design)
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- BABY BOILER
- S.S. TOP TABLE & S.S. TANKS
- VACUUM EVAPORATED VESSELS

GEETA FOOD ENGINEERING

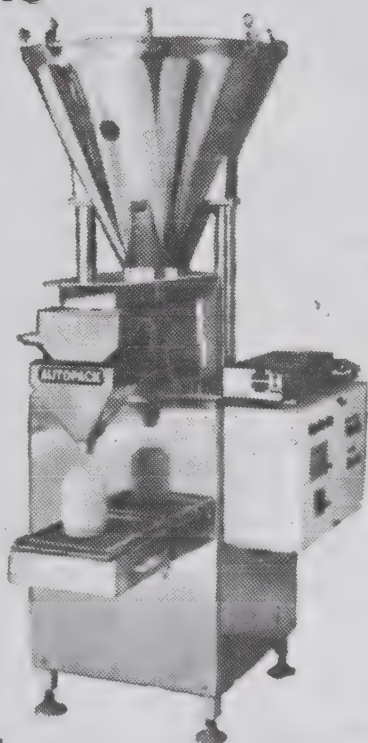
Plot No. C-7/1 TTC Area, Pawana MIDC, Thane Belapur Rd.
Behind Savita Chemicals Ltd., Navi Mumbai 400 705
Tel: 7906450, 7906451, 7610907
Resi: 7662098 • Telefax: (022) 7610907

Weighmetric Filling Machine

Model-WF-1

Special Features

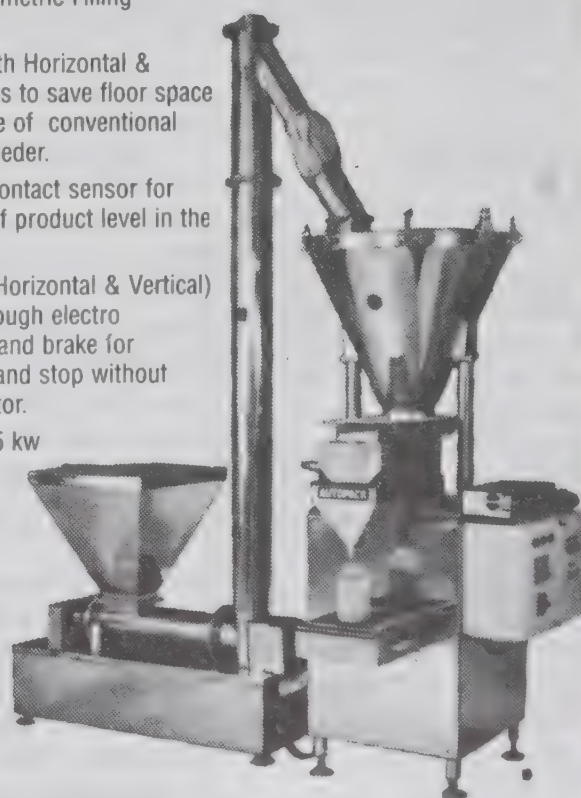
- Dosing Unit for Granules, Free Flowing Powders, Wheat, Rice, Pulses, Peanuts Cashewnuts, sugar, Tea, Coffee Beans, Farsan Cereal Foods, Candies etc. on weight basis.
- Weight controlled by Load-Cell with microprocess programmable system.
- High level of accuracy with the facility of coarse and fine feeds.
- Filling range from 5 gms to 1 kg. Higher capacity models for filling upto 10 kgs.
- Feeding system with electromagnetic linear vibrator.
- Power input : 0.5 k.w.
- Output : upto 2000 fills / hr.
- Special models with multiple filling heads/ automatic handling of containers for higher outputs.



Weighmetric Filling Machine with Screw Feeder

Special Features

- Automatic feeding of product from ground level silo to the charge hopper of Weighmetric Filling Machine.
- Screw Feeder with Horizontal & Vertical Segments to save floor space unlike in the case of conventional inclined screw feeder.
- Electronic Non-contact sensor for precise control of product level in the charge hopper.
- Screw Feeders (Horizontal & Vertical) are operated through electro magnetic clutch and brake for immediate start and stop without affecting the motor.
- Power input : 1.5 kw



Manufactured & Marketed by

AUTOPACK MACHINES PVT. LTD.

Office : 101-C, Poonam Chambers, Dr. A.B. Road, Worli, Mumbai - 400 018 (India)

Tel : 493 4406, 497 4800, 492 4806, 491 0593 • Fax: 022-496 4926

E-mail: autopack@bom3.vsnl.net.in • Website: <http://www.autopackmachines.com>

A U T O P A C K

WATER PURIFIER



Alfa Water Purifiers are amongst the leading manufacturers of ultraviolet water purification systems in the country with an experience of over one-decade in the field. They specialise in process water applications where bacterial disinfection of process water, which is used in manufacturing and washing areas, is of utmost importance.

The Alfa AP-Series models are capa-

ble of purifying water from 100 to 1,00,000 litres/hour based on customer's specific needs.

The Alfa systems use the principle of Ultraviolet light to purify water without the addition of any chemicals or heat. High intensity germicidal lamps totally inactivate water borne bacteria, viruses and pathogenic microor-

ganisms.

Alfa water purification systems find wide application where bacteria free water is required and is ideally suited for food industry, hospitals, bottling plants, pharmaceuticals, and drinking water systems and for process water in industries.

The unique advantage of the Alfa UV systems is that they offer an optional **On-Line Fail-Safe validation** with the help of

the Alfa Sensor which is an Ultraviolet Monitor to ensure proper disinfection efficiencies, thus making the UV system Reliable and Effective.

They are experts in sizing the customer's requirements and offer professional solutions to bacterial disinfection problems in the process industry using the UV principle.

They have successfully catered to a wide and impressive customer list. That includes firms like Pepsi, Parle, Kwality Biscuits, Naik Sea Foods, Libran Sea Foods, Gausia Foods. Pfizer, Bayer, Johnson & Johnson, Jaslok Hospital, Bombay Hospital etc.

They will be able to provide a suitable solution to your bacterial problems in water if you send them details like feed water quality, quantity of water to be purified per hour and specific application along with a sketch of the piping layout.

For further information, contact:

Ace Hygiene Products

222, Shah & Nahar A-2

Lower Parel

Mumbai 400 013

Tel: (022) 494 5957, 495 4190

Fax: 91-22-495 4250

AIR CURTAINS

Russell Air-Curtains marketed by Donromos Pvt. Ltd., create an uniform formidable barrier of air stream at an opening against heat, dust, smoke, odour and insects, without hindering the movement of people and merchandise in and out of the area.

Manufactured by maintaining strict quality control right from procurement of raw materials to the final assembly line, the product undergoes mandatory rigid tests before it leaves factory premises. The radial flow configuration attained with specially designed body and impellers along with

power efficient motors ensures air displacement at minimum noise levels. Its aesthetic elegance and sleekness matches all interiors and is available in Horizontal, Vertical and Portable models in powder coated and stainless steel bodies for commercial and industrial places.

For further details, contact:

Donromos Pvt. Ltd

Russell House, 74, 2nd Hasnabad Lane, Opp. Willingdon Gym.,

Santacruz (W)

Mumbai 400 054

Tel: 605 5028/6497615, Fax: 605 5027

Email: russell@bom5.vsnl.net.in

FOOD COLOURS

Narmada Food Colours Pvt. Ltd. are manufacturers and exporters of a range of Water soluble as well as Lakes of Food Colours such as Tartrazine, Sunset Yellow FCF, Carmoisine, Ponceau 4R, Erythrosine, Brill, Blue FCF, Indigo Carmine, Quinoline Yellow WS/SS, Amaranth and variety of mixtures and blends.

Narmada Food Colours Pvt. Ltd. is an ISO 9002 certified company, with their factory located at Bhavnagar, Gujarat.

For further details, contact:

Narmada Food Colours Pvt. Ltd.

Sanghrajka House, 4th Floor

431, Dr. Dadasaheb Bhandarkar Marg Opera House, Mumbai 400004

Tel: 3801315, 3801316

Fax: 0091-22-3801337

Email: dadajee@bom7.vsnl.net.in

Fact: Plot 282, Village Kardej (Navagam) Bhannagar 364060, Gujarat

FOOD INGREDIENTS

Jay Chem Marketing are authorised distributors for various food Ingredients and Preservatives such as Aspartame, Acesulfame K, Calcium propionate, Carrageenan, Enzymes, Glucose, Delta Lactone, Glyceryl Mono Stearate (GMS), Mono Sodium Glutamate, Pectin, Potassium Sorbate, Sorbic Acid, Sweetners and Xanthan Gum.

The ingredients are available regularly and at competitive prices.

For your requirements, contact:

Jay Chem Marketing

B/5, 3rd Floor, Nemi Krishna Society V. L. Road, Kandivali (W)

Mumbai 400 067

Tel: 022 8020141/8061337

Fax: 022 8061337

Email: jaychem@bom3.vsnl.net.in

FLAVOURS/ESSENTIAL OILS

The company manufactures a wide range of Liquid Flavours, Emulsions and Pastes, Culinary Essences and Essential Oils which find application in industries like aerated and non-aerated Soft Drinks, Biscuit & Confectionery, Dairy, Snacks & Savouries, Chewing Gums, Health Beverages, etc.

For your requirements, contact:

Nova Flavours & Fragrances (P) Ltd.

301, Sterling Estate

3rd Floor, Plot No. 8

Inside Spectra Motor Compound

Ramchandra Lane, Extension

Kachpada, Malad (W)

Mumbai 400 064

Tel: 8446405, 8446481 Telefax: 8812059

Email: hopl@bom5.vsnl.net.in

JUICE / LIQUID PACKING MACHINE

Lucas Electronics manufactures juice/liquid packing machines, in particular the Master Seal Liquid Filling LE-F.F.S-200 Series vertical Packaging Machine.

This machine automatically forms a bag, fills it, then seals and separates the finished packets. The LE-F.F.S-200 is suitable for all kinds of low density

SPRAY DRYING OF SPECIALITY INGREDIENTS

The Best of American Technology at your Service

Introducing Modern Spray Drying Plant Designed for Speciality Ingredients to Produce High Quality Value Added Spray Dried Powder which Retain and Conserve Original Attributes of the Product.

SALEABLE FEATURES

- ★ SS316 Construction
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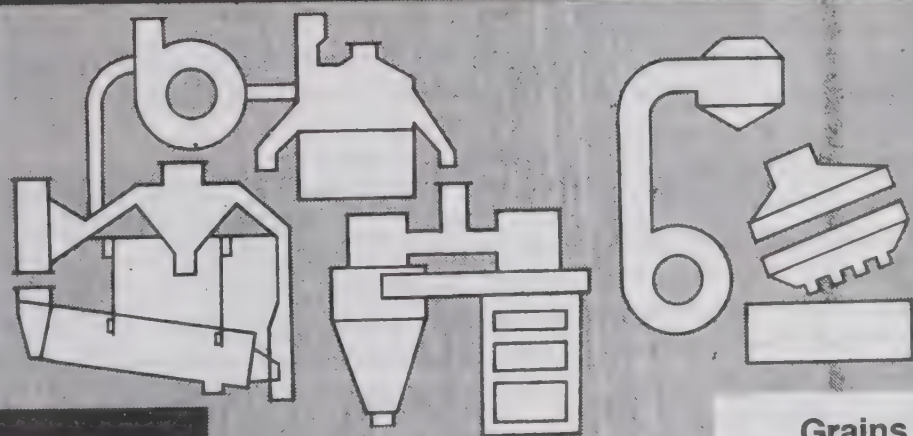
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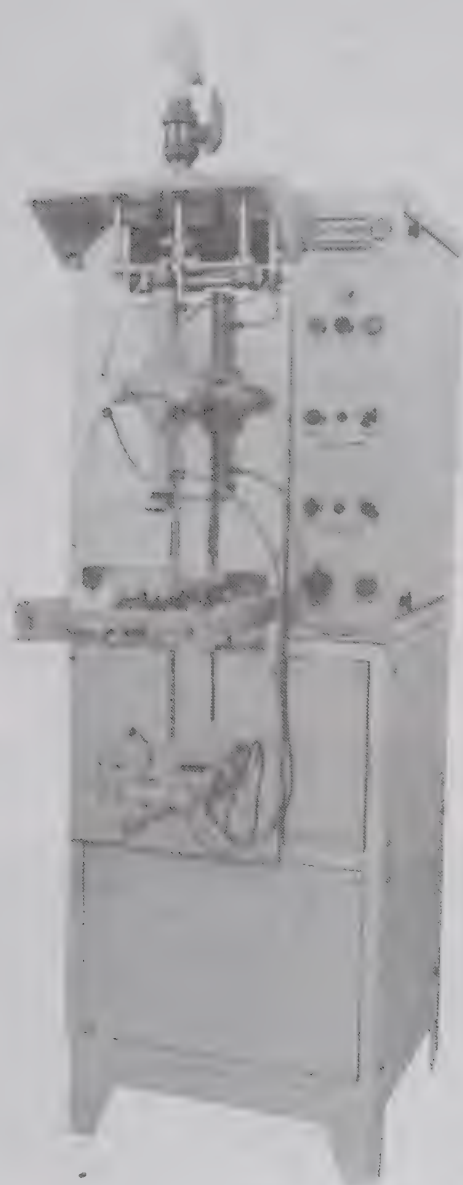
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This combination of different processes, the dependency on chemicals to be closed and following steps of contaminants removal involve high maintenance and operating costs. It is evident that the complexity of the system makes it difficult to quickly optimize the performance. Moreover, the partial effectiveness of flocculation and sand filtration as regards the removal of microorganisms, imposes the realization of a heavy disinfection step, though it is uncertain whether pathogens, such as cryptosporidium will be removed.

Further complication of the conventional treatment are the formation, during coagulation or flocculation, of a chemical-rich sludge to be treated and disposed and the high wastage of water for sand filters backwashing. These considerations are an explanation for increased interest in membrane separation technology for surface water treatment.

The advantages of HAR's MEMBRAPURE™ process can be briefly summarized as follows: • maximized permeate water quality, independent of raw water quality • Compact construction, modular, thus extremely flexible • Very low chemical dosage and energy consumption • Extremely reduced demand for disinfectants thanks to the sieve effect through the membrane physical barrier resulting in very high removal rates of all pathogens.

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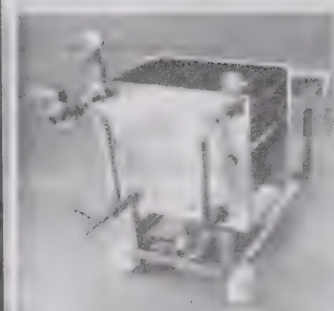
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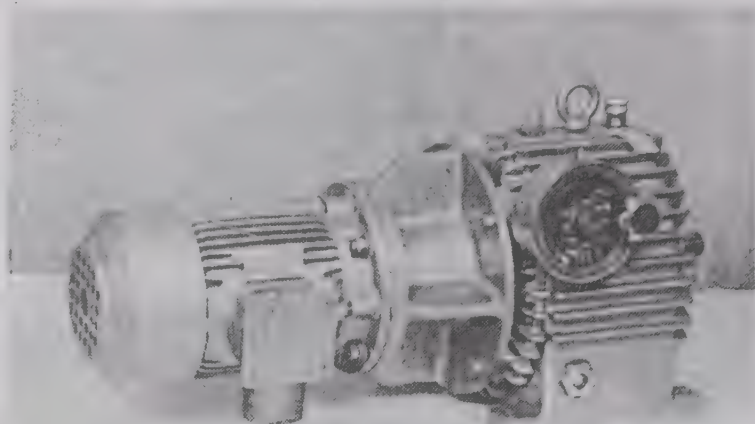
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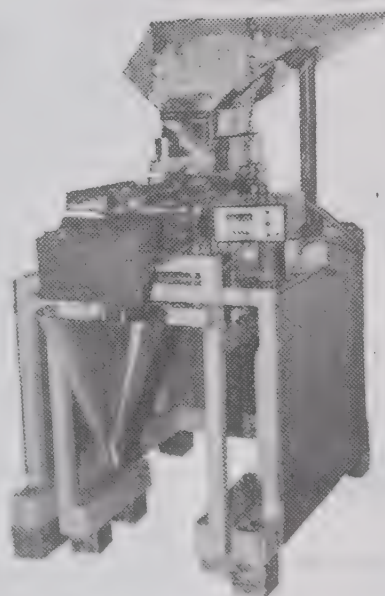
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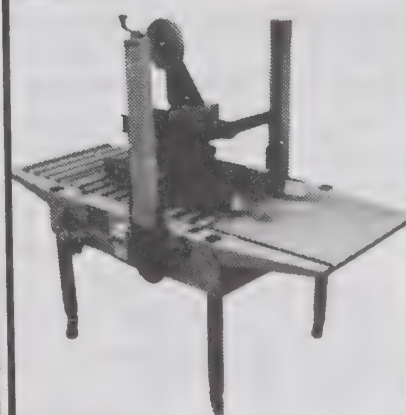
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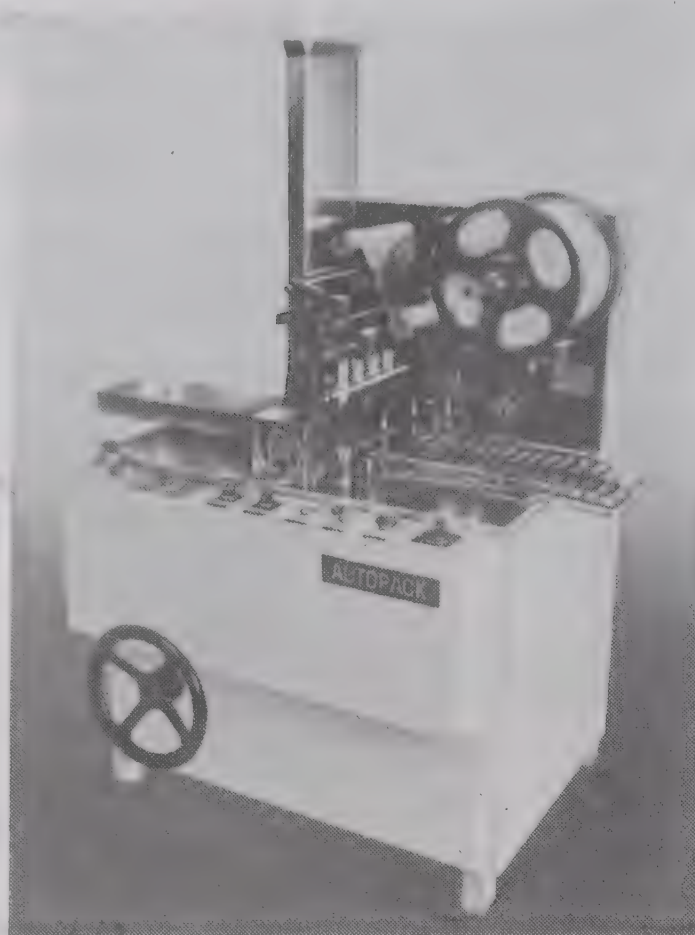
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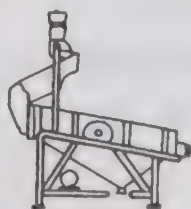
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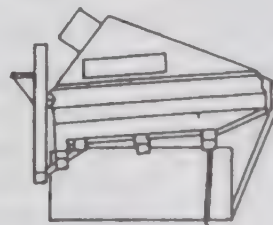
Aspirator



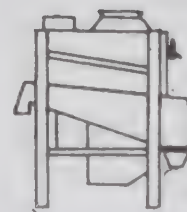
Huller



Screener Grader



Gravity Separator



Destoner

Custom Designed Separation Systems for the processing Industry
Under Technical Collaboration of **FORSBERGS INC. USA**

COLD ROOMS



Geerlofs Refrigeration from Netherland are specialists in setting up precold and cold stores, freezer stores, blast freezer &

I.Q.F. for storage of fruit, vegetables and agricultural products. They are useful in Horticulture * Floriculture * Tissue Culture, Agricultural products * Seeds, Spices & Herbal Products * Food & Dairy Products, Meat, Fish * Poultry * Warehouses * Cargo Complexes Supermarket outlets.

For further details, contact:

Geerlofs Cooling India Pvt. Ltd.

(Old No.43) New No. 69
Fourth Avenue
Ashok Nagar
Chennai 600 083

Tel: (O) 44-489 9340/41
Fax: (O) 44-489 9343
Email: geerlofs@vsnl.com

PACKING MACHINES

New Indo International is a leading manufacturer of Packaging Machines for the last 10 years.

They manufacture On Edge Pillowpack Machine which is used for packaging biscuits without inner wrap having automatic feeding arrangement to precisely take the stacked length and transfer the biscuits smoothly into the main feeding conveyor. The speed of the machine is 40-100 packs per minute according to the size of the products. The electronic digital temperature controllers maintain the accuracy of temperature for different pack-

ing materials.

The company also manufactures Horizontal Pillow Packing Machines, Candy Packing Machines, Candy Twist Wrap Machine, Wafer Cream Spreading Machine, Wafer Cutting Machine and Tube Expanders.

For further details, contact:

New Indo International (Regd.)

135-A, Begumpur
Malviya Nagar
New Delhi 110 017
Tel: 6685315, 6687476, 6683289
Fax: 011-6688290
Email: nii@vsnl.net.in
Internet: <http://www.newindo.com>

ION EXCHANGE/ADSORBENT RESINS

Pharmaconcept are the official distributors for Ion Exchange and Adsorbent Resins from Resindion S.R.L., a company of Mitsubishi Chemical Corporation.

MCI Gel, available in bulk packings for **HPLC**, **Diaion Sepabeads** in preparative grade and **Diaion Sepabeads Relite** in industrial grade, find application in enzyme purification and immobilisation, sucrose & starch hydrolisates purification and separation, whey and lactose demineralisation, fruit juice debittering and decolorisation, amino acids and carboxylic acids recovery and purification, gelatin purification etc.

For further details, contact:

Pharmaconcept

203, Malwa, Patanwala Estate
L.B.S. Marg, Ghatkopar (W)
Mumbai 400 086

Tel: 022-5003400, 5006777, Fax: 5001358
Email: sis@bom3.vsnl.net.in

TIN CONTAINERS MAKING MACHINE

Ganga Singh Engg. Pvt. Ltd. manufacture a range of Tin containers in round, rectangular, oval shapes.

The company also manufactures seaming machines for packing liquids, dry contents and pesticides.

For canning industries, the machines available are: Semiautomatic sealing machines, can reforming machines, can flanging machine both power and hand operated.

For further details, contact:

Ganga Singh Engg. Pvt. Ltd.

1 Vishal Ind. Estate
Village Road
Bhandup (W)
Mumbai 400 078
Tel: 5600562, 5690572 (R) 5645287
Fax: 5649312
Email: ganga@bom4.vsnl.net.in
URL: <http://www.gangengg.com>

ULTRAVIOLET WATER DISINFECTION SYSTEM

Ultraviolet Water Disinfection System using the latest US based Teflon® Technology is the ultimate answer to prevent pollution and contamination in water. Non-fouling Teflon® Tubes UV units for water and waste water treatment are used to overcome scale problems.

These units find application in disinfection of drinking/process water, pre-treatment before R.O., algae and slime control, purer fermentation products. The system can also be used for various industrial applications such as supply of high purity water for beverage, bottling, brewing pharmaceuticals, food processing etc. It achieves near cent percent water purity without any side effects. It is also cost effective and maintenance free.

Among the products offered are various models of water disinfection systems, ranging from 225 LPH to 12 Lac LPH of UV systems, micron filters, carbon filters, air irradiators etc.

For further details, contact:

Hitech Ultraviolet Pvt. Ltd.

P.O. Box. No. 8356, 35, Grace Plaza
S.V. Road, Jogeshwari (W)
Mumbai 400 102
Tel: 6790610, 6794611, 6794327
Fax: 6794337
Email: hitechuv@bom5.vsnl.net.in

FILTER PRESS

The SEPRA Plate and Frame type Filter Press from Parksan Filters Pvt. Ltd. meets all specifications of the critical filtration process, and has applications in Pharmaceutical, Brewery and Soft drinks industries. SEPRA is available in three sizes, viz: 60x60 cms, 40x40 cms and 20x20 cms. The filter press is made of stainless steel and has roughing out, polishing and sterilizing filtration function. The change over plate permits pre-filtration combined with final filtration in the same unit. It is suitable for thin/viscous products.

Parksan Filters Pvt. Ltd. have a wide product range of S.S. 304/SS 316 Filter Presses which include:

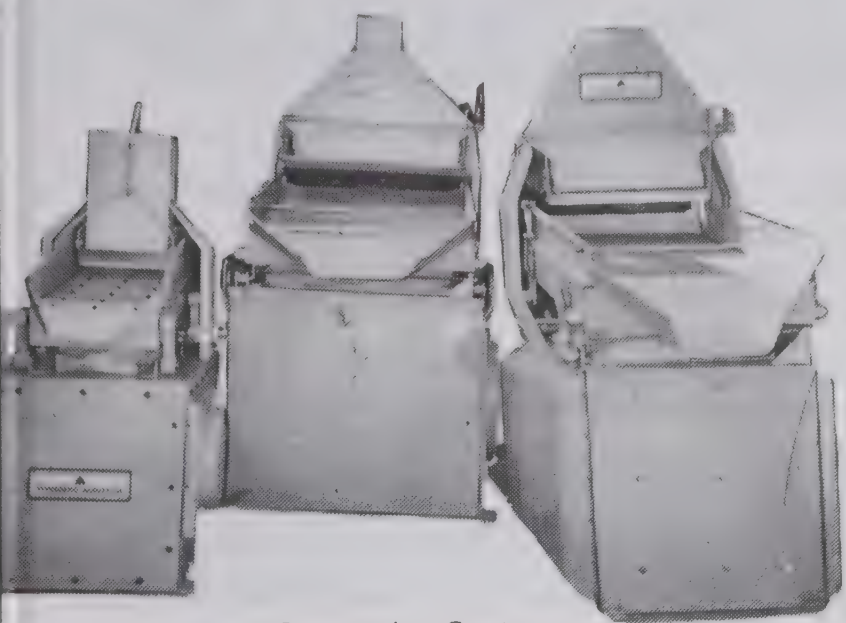
- **Ring Pack:** S.S. Candle Filter Unit
- **Separa:** Plate and Frame Type Filter Press
- **Liquitech:** Horizontal Pressure Plate Filter
- **Panier:** Bag Filter System
- **Cartfil:** Cartridge Filter System
- **Vessel:** Fermentor/Reactor Vessels
- **Pifit:** Pipe Fittings
- **Pumps:** Mono Block Design - Centrifugal.

For more details, contact:

Parksan Filters Pvt. Ltd.

3 Saraswati Indl. Estate
Navghar, Vasai Rd. (E)
Dist. Thane 401210
Tel: (0250) 338413, Fax: (022) 8995838
Email: parksan@bom5.vsnl.net.in

CLEANING - GRADING MACHINES



Forsberg Agritech Separation Systems custom designed for the processing industry under technical collaboration of Forsbergs Inc., USA.

Now available from Forsberg Agritech the Leading-Edge Technologies and processes. These are continuous and integrated processes for * Dehulling of same Seeds * Dehusking of Grams and pulses * Dehulling of Sunflower Seeds for confectionery, Sunflower Kernels and high quality oil and DOC * Decortication of Neem fruit and Neem seeds * Production of husk

are Most efficient in stone separation, Require least H.P., Capacities available from 1 TPH to 15 TPH, Models available are Pressure type and Vacuum type.

For details, please contact:

Forsberg Agritech (India) Pvt. Ltd.
123, GIDC Estate
Makarpura, Baroda 390010
Tel: (0265) 645752
Fax: (0265) 641683
Email: forsagri@satyam.net.in

free Soya dal for edible soya products and production of full fat soya flour.

They also supply fully Automated Plant and Machinery for: Whole Dried Chilli Destalking and Chilli Powder Processing * Garlic and Onion Processing * Production of Cereal flakes * Choco spreads/Nut spreads processing and manufacture * Fried foods and savouries processing and production * Processes for ready mixes and specialty foods.

Forsberg Destoners

TWIN SPRAY DRYING FACILITY

Sarvaiya Chemicals Industries, a reputed private limited company, established in 1989, offers Twin Spray Drying (S. 316-L) Facility at Vapi in Gujarat.

This Facility is used for aqueous extracts of agriculture/vegetables/plants/ice based raw materials and liquids/Emulsions of foodgrade chemicals to be used as natural ayurvedic herbal food ingredients).

The modified plant has a water evaporation capacity of 500 & 1000 Lit/hr giving lowest possible product temperature.

For more details, contact

Sarvaiya Chemicals Industries Pvt. Ltd.
1/3, Delite Palace, 1st Flr.
G. Rd., Ghatkopar (W)
Mumbai 400 086
Tel: 022-5114968, 5128114
Fax: 0260-424941/ 427941
Email: sarvaiya@bom5.vsnl.net.in

FOOD PROCESSING EQUIPMENT

The company manufactures a wide range of Food Processing Equipment. The company also fabricates Machines to specifications.

Their product range includes * Steam Jacketted Kettles * Pulper-cum-Finisher * Papaya Cubing Units * Pineapple Slicing Machines * Juice Extractors * Fruit and Vegetable Crushers * Pickle Filling Machines.

Other products manufactured by them are: Bottle Washing and Filling Machines, Exhaust Box, Boiler, SS Tanks, Vacuum Evaporated Vessels.

For further details, contact:

Geeta Food Engineering
Plot No. C-7/1
TTC Area, Pawana MIDC
Thane-Belapur Road
Navi Mumbai 400 705
Tel: 7906450/51, Tel/Fax: 761 0907

to clients.

For further details, contact:

Universal Tastemakers
133, New Apollo Estate
Mogra Road
Andheri (E), Mumbai 400 069
Tel: 8322631/8350989, Fax: 8378156
Email: universaltastemaker@rediffmail.com
Website: www.unifood.opi.com

PVC/PU CONVEYOR BELTS

Continental offers a variety of PVC/PU Conveyor Belts in the width of 50mm to 200 mm and thickness of 1mm to 5mm.

Special Belts with rough top and bottom surface and also food grade quality are available.

For further details, contact:

Continental Belting Co. Ltd.
Commercial Chambers
101, Rajinder Nagar Market
New Delhi 110 060
Tel: 011-5752904
Fax: 011-5752904/7234
Email: stallion@nde.vsnl.net.in

CAP SEALING MACHINES

Raj Products & Equipments Pvt. Ltd. marketed Twist-off Lug Cap Sealing Machines. The machine hermitically seals the bottled products with twist-off/vacuseal Lug Cap to preserve the taste and flavour of the products. The Lug cap Sealers using latest technology eliminates the work of holding the glass bottle during capping and does not need a skilled worker. It gives effortless manually operation of replacing bottles one after another.

More than 100 machines are being used all over India.

For further details, contact:

Raj Products & Equipments Pvt. Ltd.
P.O.Box 8075
Mumbai 400 056
Tel: 816 2250
Telefax: 91-22-8162750
Email: foramfod@bom5.vsnl.net.in

FLAVOURS/EMULSIONS

Sonarome have acquired a reputation for high quality and professional service to their customers.

The company has extensive range of flavours, emulsions and concentrates for use in aerated and non aerated beverages, biscuits and bakery products, confectionery, snack foods, pharmaceuticals, alcoholic beverages.

Among the customers served by Sonarome are several multinationals and big corporations. The company's products are exported worldwide. Sonarome is a professional managed company with their own trained sales personnel located in all principal cities of India and internet presence.

For your requirements, contact:

Sonarome Chemicals Pvt. Ltd.
Peenya Industrial Area, II Stage
Bangalore 560 058
Tel: +91-80-8360804/8360595/8361689
Fax: 3415802
Email: sonarome@sonarome.com
URL: www.sonarome.com

SEASONINGS/SPICES

Universal Tastemakers are leading suppliers of Seasonings, Speciality spices, mixes, food ingredients, Snacks food raw materials and Tastemakers. The seasoning do not contain any synthetic food colours or any other banned ingredients. They supply Indian, Continental and Chinese seasoning. They also offer free consultancy on any aspect of Snack Food

FILTERS/STRAINERS

'SHARPENN' was promoted a decade ago by a group of technocrats to manufacture filtration equipments. The company functions with custom built equipments, particularly pressure lead filters - vertical and horizontal to handle filtration of a wide range of products for Pharmaceuticals, chemicals and vegetable oil refinery industries. These filters are an alternative for the outdated plate and frame filters. The advantages of these filters are that they are totally automatic, occupies less space, less retention in the cake, no recurring expenses and eco-friendly.

In addition the SHARPENN range products includes drum driers, flakers for conversion of liquid into flakes, centrifuges for liquid-liquid separation, multi-bag filters and all other filtration equipments.

'SHARPENN' leadership position in separation Technology and oil refinery is backed by their team's qualified knowledge and years of experience.

In engineering, design, drafting, and manufacturing 'SHARPENN' does all the work with in-house facility. This advantage assures performance, service after sales you can trust, delivery you can rely on.

They are one of the very few manufacturers in the business that design, manufacture and test all its equipment with their own facilities.

For further details, contact:

Sharpenn Technologies Pvt. Ltd.

Shanmugananda
D-56 MIDC
Behind London Pilsner
P.O. Box. No. 19
Nerul, Navi Mumbai 400706
Tel: 7907201/2/3/4 7613871
Fax: 91-22-7907205
Email: subra@bom3.vsnl.net.in
Website: www.indialink.com/sharpenn

FOOD FLAVOURS

Food flavours play a prominent role in various food products and beverages. Estosha Pan is involved in research, development, creation and production of flavour specialities based on 40 years experience in fields of Organic Chemistry, Biochemistry, Process Engineering and Toxicology. The R&D chemist and flavour specialist work with raw materials of natural and synthetic origin, with due consideration on their IFRA guidelines, FDA regulatory status and FEMA & proposals.

Our Flavours well synchronize with the provided taste and deliver the most natural/suitable effect to end product, thus support and reinforce your brand image, products efficacy, packing and promotion strategy. To achieve the excellence in organoleptic properties of flavours, a thorough study on the process of Biogenesis, Maillard Reaction, Lipolysis and Fermentation is done. The products meet the highest international quality level. Special attention is given to quality control. They use modern chromatography and spectroscopy to guarantee high consistent quality.

Their products range covers the following flavour applications: * Baked foods and flour

confectionery * Sugar and Chocolate Confectionery * Soft drinks and non-alcoholic beverage * Liqueurs and Alcoholic beverages * Dairy product-like cheese, yogurt, butter, ice cream and milkshakes * Grocery products like desserts, confections, sauces, pickles, dry mixes and culinary flavours * snack products like chips, extrusions * Vegetables * Savoury * Meat and fish products - fresh, canned and frozen * Pharmaceuticals.

They also manufacture Ready-to-use food preservatives and antioxidants for wide range of applications.

The flavours are technologically and aesthetically compatible with the end products and are readily handled in the food-processing department. It is capable of accurate dosage and is readily and thoroughly disperseable throughout the product mix. It is also economically viable.

For further details, contact:

Estosha Pan

209, Munish Plaza
20 Ansari Road
New Delhi 110 002
Tel: 011-3256698, 3283424
Fax: 91-11-3268342
Email: etosha@del2.vsnl.net.in
Website: www.etoshapan.com

CHEMICALS

Advance Chemical Sales Corporation are suppliers of various chemicals like anticaking agents, anti-oxidants & bottle washing compounds detergents and cleaners, detergents for tanks and pipe cleaning, disinfectants and sanitizers, food and dairy plant cleaners, milk stone and beer scale removers.

They also supply food additives such as Acetic Acid Glacial, Acid Sodium Pyrophosphate, Bentonite Power, Benzoic Acid, Calcium Citrate, Calcium Gluconate Di Ammonium Phosphate, Di Calcium Phosphate, E.D.T.A. Di Sodium, Ferrous Sulphate (Hydrated/Dried), Fumaric Acid, K.M.S., Lactic Acid, Magnesium Carbonate Light, Malic Acid, Phosphoric Acid, Potassium Bi Tartrate, Sodium Benzoate, Sodium Citrate, T.B.H.Q., Tannic Acid, Vitamin-C, Zinc Sulphate among others.

For further details, contact:

Advance Chemicals Sales Corporation

138, Pul Mithai, 1st Floor
Teliware
New Delhi 110 006
Tel: 011-3629151, 3529151
Telefax: 011-3625660
Mobile: 98100-28065
Email: advchem@vsnl.com

COOLING TOWERS

Blue Chip Cooling Towers are manufacturers of FRP/Timber/Induced/Nat Towers with capacity ranging from 5 to 600 TR. These cooling towers find application in A.C. refrigeration plant, D.G. Sets, Plastic Machines and Process Cooling.

The company's speciality lies in revamping and repairing of Timber Towers. They also stock spare parts of a number of other makes.

For further details, contact:

Blue Chip Cooling Towers Pvt. Ltd.

123, Sonal Link Industrial Estate No.2
Kanchpada, Link Road
Malad (W)
Mumbai 400 064
Tel: 880 5089, 880 5164
Telefax: 8805164

GLASS BOTTLES

R.G. Glass Industries are specialists in glass bottles for aerated waters, in white, amber and green colours manufacturer on fully automatic plants.

They also supply plastic bottles and wooden crates. They are dealers in old as well as new glass bottles.

For further details, contact:

R.G. Glass Industries

11B, Petwalla Compound
244, Maulana Azad Road (North)
Opp. Urdu Times
Near Nagpada Junction
Mumbai 400 008
Tel: 3072326/3086984/3099896
Fax: 3010223
Email: rgglass@vsnl.com

PROCESSING PLANTS/EQUIPMENT

Metal Plants manufacture and supply • Distillation plant for geranium, citronella, lemon grass oil • PLC Controlled automated Batching/Blending Systems • MS-3 Emulsifiers, Contra Rotary Mixers • Process Equipment such as Reactors, Heat Exchangers, Columns, etc.

For further details, contact:

Metal Plants

17, Anupam Indl. Estate No. 2
Off Pt. M.M. Malaviya Marg
Mulund (W)
Mumbai 400 080
Telefax: 5610628, 565 4607
Email: koppa@bol.net.in

FOOD EXPO - 2001

National Exposition on Food, Food Processing and Packaging Industry

Date : 28th April to 2nd May, 2001

Venue : PALACE GROUNDS, BANGALORE

Co-Sponsored by : GOVERNMENT OF KARNATAKA
Supported by : CENTRE FOR PROCESSED FOODS

Show casing latest technologies in food processing, refrigeration, packing, handling, storing and food products

DISPLAY PROFILE:



Equipment & Systems : ♦ Food Processing ♦ Storage & Handling ♦ Packaging ♦ Aseptic Facilities ♦ Refrigeration ♦ Bakery ♦ Confectionary ♦ Dairy ♦ Cold Storage ♦ Air and Water Pollution Control ♦ Hotel & Kitchen ♦ Health & Fitness.



Food Products : Processed & Frozen Foods ♦ Spices ♦ Sea Foods ♦ Cereals ♦ Edible Oils ♦ Confectionery ♦ Packaged Foods ♦ Additives & Preservatives ♦ Health Foods ♦ Herble Products ♦ Beverages ♦ Poultry ♦ Dairy Products ♦ Bakery ♦ Fruits & Fruit Juices ♦ Mineral Water ♦ Soft Drinks ♦ Beverages (Exculding Alcoholic Drinks).



Others : Research Institutions ♦ Export Promotion Councils ♦ Consultancy Services ♦ Service Providers ♦ Associations / Trade Promotional Bodies.

The fair will also help the participants in achieving inter alia;

- | | |
|-----------------------|--|
| a) Market Penetration | e) Vendor Creation & Outsourcing opportunities |
| b) Market Improvement | f) Image / Brand building |
| c) Product Promotion | g) Networking in various aspects in developing the business. |
| d) Sales Promotion | h) Understanding the competition. |

For further details please contact:

ENTERPRISING EXHIBITIONS

8th Main, 9th Cross, Shivanagar, Rajajinagar, BANGALORE - 560 010. Phone : 080-3357758 / 6783464,
Fax : 080-3324338 / 3343676 Email : foodexpo2001@yahoo.com / cpfbang @ bgl.vsnl.net.in

MAGNETIC SEPARATORS/ METAL DETECTORS



Eriez-Mbi India Ltd. are manufactured of Magnetic Separators, Metal Detectors & Vibratory Feeders for the Food processing Industry. * The **Plate Magnet** protect against contamination in processing lines, and has size magnetic

strengths including Super Strength Erium® 3000. * The **Grate Magnet** extract small and fine from when installed in steep-sloped, odd and irregular-shaped hoppers, vertical closed chutes and ducts. Available with Super Strength Rare Earth Elements (developing intensity over 11,000 gauss) in all models. * The **Ferrous Trap** purify products in liquid and slurry lines by removing small particles of scale, oxides and iron contaminants and come in models.

Other products are E-Z Tec® Vertical Reject System, E-Z Tec® Metal Detector and Hi-Speed Feeder which is a Electromagnetic Vibratory Feeder. These products are marketed by McNally Bangalore Industries Ltd.

For more details, contact:

McNally Bangalore Industries Ltd.

P.O.Box: 28, White Field P.O.,

Bangalore 66

Tel: 080-8452596/97/98/99

Fax: 080-8452764

Email: erz@mcnallybir.com

Eriez-MBI-India Ltd.

Email: emil@emil.co.in

BAKING MACHINE

R&D Engineers are India's first & foremost manufacturers of Wafer biscuit & Ice-cream cone machines. Their years of experience and with the application of latest design and technologies to meet exacting market demand. Their product ranges from small table top machines to fully automatic machines. They also design and supply tailor made solutions to an individual customer need.

R&D Machines are characterized by highest standards in precision, in operating ease, utmost durability and service life.

The "ZE" series of semiautomatic machines are used for baking ice cream cones, sugarcane and cups. These machines are easy to use and are robust.

The heating is by electrical heaters designed to optimize energy use and thermal distribution, still flexible for high production on nonstop basis for 24 hours.

The machines manufactured by then are Ice cream cone baking machine, Batter mixing machine. Automatic wafer baking machine, Manual Baking Tongs, Rolled Sugar cone machines, Automatic and Semi-Automatic baking machines.

For more details, contact:

R&D Engineers

A-41, IDA Kukatpally, Phase II

Road No. 4, Via I.E., Gandhi Nagar

Hyderabad 500 037

Tel: 3079121, 3079878

Fax: 91-40-3078668

Email: randengg@hd1.vsnl.net.in

AUTOMATIC SEALING MACHINE



Automatic Pouch Seal machine, Band Sealer both vertical and horizontal ma-

chine are suitable for sealing PE, PP, PVC, Aluminium Foil Bag, Polycelle Bag and other heat sealing virgin or laminated materials with automatic temperature control device with cooling blower and conveyor as per requirement.

These machines are cost effective, having high speed with automatic measuring devices and photo cell attachment to ensure proper registration of pouch. Automatic form fill and seal machine is collar type to fill liquid, paste, powder and granules upto 5 kg.

Mini pillow wrapping machine is hygienic and packs candies to keep them fresh with for a longer period. Horizontal pillow pack packing machine have high speed automatic packing to reduce man hours. The core aim of thermal devices is to reduce the cost in operation and to increase

SEALING MACHINES

Automag are the sole distributors of Max Co. Ltd. of Japan for Electronics Machines and Food/Agricultural Products. Automag now offers MAX PACKERS HR-PS-II in Manually and Pneumatically operated models, utilising unique method of using aluminium staples to seal poly bags and casings with a single touch. An adjustable screw helps for Airtight sealing



Application areas include: *Packing food products in poly bags * Packing meat products in poly bags * Packing fruits/vegetables in nets * Packing Oil/Ghee etc. in poly bags.

For further details, please contact:

Automag India Private Limited

5/3, Jaideep Apartment, Erandwane

Pune - 411 004

Tel: 020-5443056, 020-5460835

Fax: 020-5446360

Email: aiplho@satyam.net.in

profitability.

For further details, contact:

Thermal Devices

C-9, Sector-2

Noida - 201 301

Tel: 011-8-4527971, 4547568

(R) 011-2203564, 2241136

Email: esteloimpex9@hotmail.com

sharmanitin67@hotmail.com



AUTOPACK

A total concept in packaging

POWDER DOZING MACHINE MODEL P.D.- 30

Dozing unit for accurate filling of powders like tooth powder, talcum powder, baby powder, dry syrups, coffee etc.

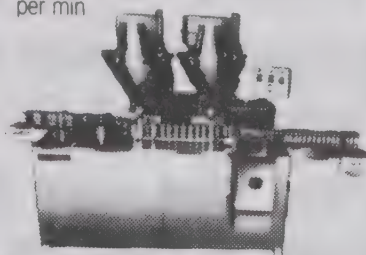
- in pouches or containers.
- Output upto 2000 fills/hr.
- Power input 0.75 kw.



AUTOFILL MODEL P.F.- 90

Completely automatic powder filling machine for filling all types of powder in bottles/containers of different sizes and shapes

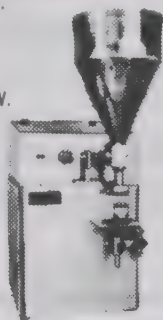
- Output upto 70 bottles/containers per min



CREAM FILLER MODEL C.F.- 30

Filling machine for creams, grease adhesives, lotions, balms, gums etc. in pouches or containers.

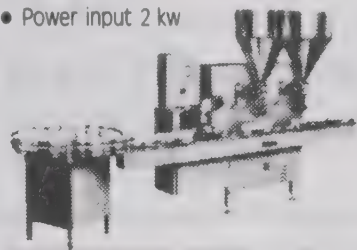
- Output upto 2000 containers/hr.
- Power input 0.75 kw.



AUTOMATIC CREAM FILLING MACHINE MODEL C.F.- 70

For filling of grease, adhesives, creams, lotions, balms, gums etc. in rigid containers.

- Output upto 4500 containers/hr.
- Power input 2 kw



COLLATING & OVERWRAPPING MACHINE MODEL C.W.- 20

Suitable for collating and overwrapping of rectangular cartons with heat sealable film. Adaptable for multiple configurations Collating upto six layers.



ROTARY MULTI HEAD SCREW CAPPING MACHINE

MODEL A.C.- 4

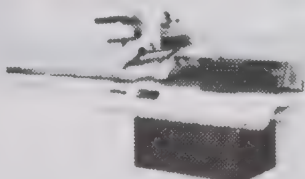
- Continuous Rotary Motion for high out puts
- Handless variety of containers / caps
- Tightening Torque adjustable to desired levels
- Smooth pick and placement of caps
- Out put upto 9000 containers / hr.
- No container - no cap facility



HORIZONTAL PILLOW-PACK MACHINE MODEL H.B.- 80

Ideal for packing solid products like chocolates, cello-tapes bandages, biscuits etc. and other food, pharmaceutical cosmetic products in solid form with heat sealable films & laminates

- Output upto 120 packets/min



AUTOMATIC CARTON OVERWRAPPING MACHINE MODEL A.W. 120

Automatic wrapping machine for overwrapping rectangular cartons with B.O.P.P./Cellophane like tooth brush carton, cassettes & blade carton etc.

- Output upto 120 cartons/min



AUTOPACK MACHINES PVT. LTD.

101-C, Poonam Chambers, Dr. A.B. Road,
Worli, Mumbai - 400 018 (India)
Tel : Off : 493 4406, 497 4800, 492 4806, 491 0593
Fax : 0091-22-496 4926

Works - I Tel : 852 2995 • Telefax : 852 3081
Works - II Tel : (0251) 435104 • Telefax : (0251) 470858
Works - III Tel : (0824) 408070 • Telefax : (0824) 409338
E-mail : autopack@bom3.vsnl.net.in

Website: <http://www.autopackmachines.com>



INSULATED CIP TANKS (CAP: 8000 Lts & 15,000 Lts)



REMINERALISE & OSMOSIS TANKS (CAP: 1000 Lts & 1500 Lts)

Specialisation:

FOOD & BEVERAGES, DAIRY, CHEMICALS, CEMENT EQUIPMENTS

WE ALSO DESIGN AND MANUFACTURE SPRAY DRYING UNIT.

SINCE FROM 1980:



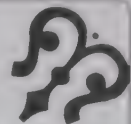
GEMINI ENGI-FAB PVT. LTD.

5-C/103, Mittal Industrial Estate, Marol Naka
A.K. Road, Andheri (E), Mumbai 400 059 (INDIA)
Tel: 8528822, 8528833, 8528866 • Fax: 8518887
Email: geminief@bom5.vsnl.net.in

We make Things that makes Mumbai proud



We Invite Editorial Contributions



If your technical/marketing personnel wishes to contribute an Article or Technical paper relating to Food & Beverage processing, we would be happy to publish it. The Articles should be of a general nature, not specially promoting products of your company

If your paper/article does not have diagrams you may send it to us by Email or on Floppy set to MS Word or PageMaker 5.0

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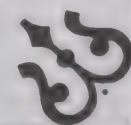
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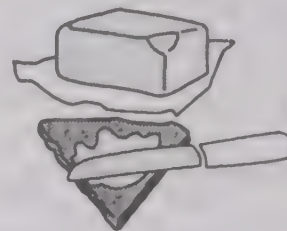


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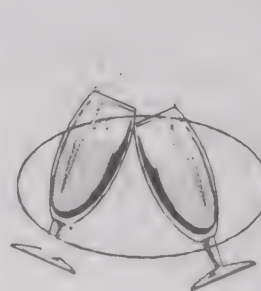
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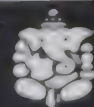


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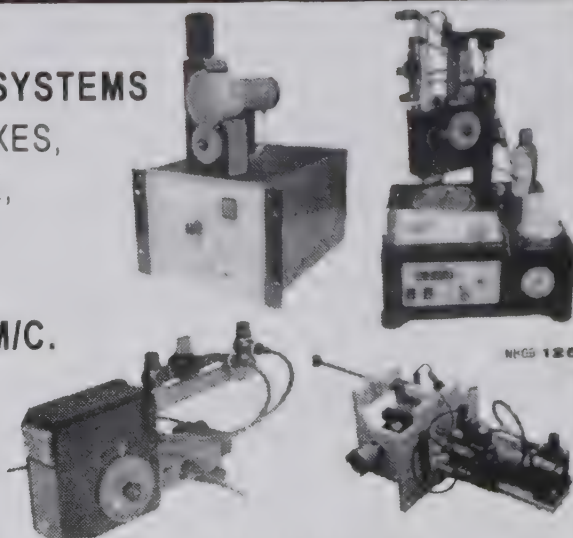
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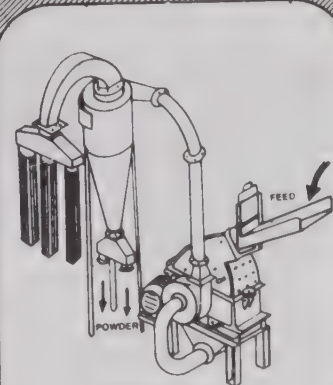
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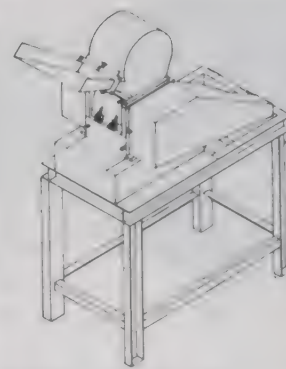
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Products: * Food Processing Machinery

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HYDRO AIR RESEARCH (INDIA) PVT. LTD., 203 Malwa, Patanwala Estate, L.B.S. Marg, Ghatkopar (W), Mumbai 400086. Tel: 5003400, Fax: 022-5001358, Email: har@vsnl.com

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Products: * Cold Storage Plants / Equipment * Fish Processing Plant * Freezers * Fruit / Vegetable Processing Machinery / Plant * Ice Making Machinery * Refrigeration Plant & Equipment

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JAY CHEM MARKETING, B/5, 3rd Flr, Nemi Krishna Soc., V.L. Rd., Kandivali (West), Mumbai - 400 067. Tel. Nos: (022) 8020141 / 8061337, Fax No: (022) 8061337 Email: jaychem@bom3.vsnl.net.in

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Garlic, etc. Also free flowing Powders of dehydrated Onion and Garlic

JET PACK MACHINES, C-18 Nandiyot Industrial Estate, Safed Pool, Kurla-Andheri Road. Sakinaka, Mumbai 400072. Tel: 91-22-8516489, 8515561, 8560800 Email: jetpack@vsnl.com, Fax: 851 6489

Products: * Packaging Machines such as * Powder Filling Machines * Cream / Paste Filling Machines * Liquid Filling Machines * Horizontal Flow Wrapping Machine * Granules Filling Machine * Capping Machines * Batch Coding Machines * Neck Sleeving Machine * Insert Sealing Machines * Aluminium Foil Sealing Machines * Carton Overwrapping Machines

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Products: Flavours & Fragrances

SOYACHEM INDUSTRIES, G-3, Ankit Apartment, 31, Vishnupuri, A.B. Road, Indore 452 017. (MP) Tel: 0731-474117/366039/284779, Email: jdgupta@bom4.vsnl.net.in

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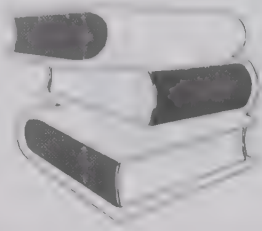
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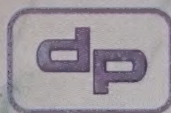
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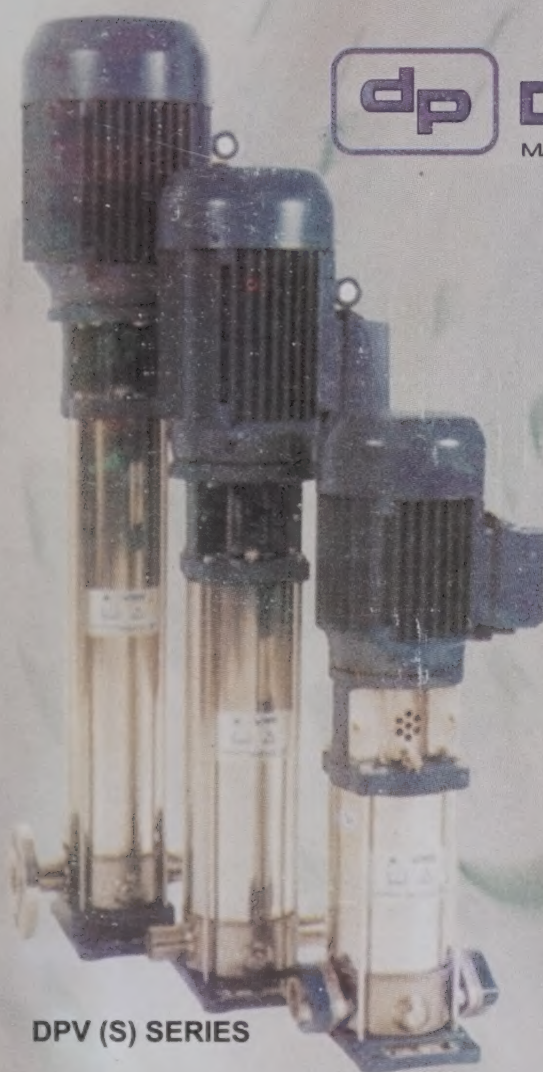


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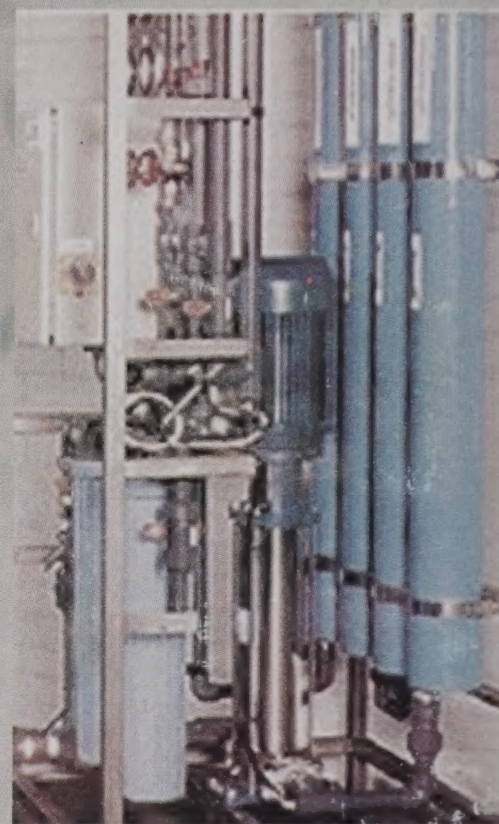


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